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NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



THESIS

A DESIGN AND PERFORMANCE ANALYSIS FOR THE HOT PRIMARY HEAT EXCHANGER (HPX) USING NUMERICAL ANALYSIS

> by Kevin Scott Muhs June, 1995

Thesis Advisor: Thesis Co-Advisor: Ronald J. Pieper Ashok. Gopinath

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The Hot Primary Heat Exchanger (HPX), a key component of the ThermoAcoustic Life Sciences Refrigerator, consists of a tube and fin design. The tubing is bent into a serpentine pattern and overlayed on a screen of copper fins. The serpentine pattern results in several flow reversals and complex internal flow geometries within the heat exchanger. The fins are not consistently of uniform length and generally have heat rejection at both ends. This design results in a forced-cooled, single stack cold plate configuration with unequal temperatures at each end of the fin. The analysis of this configuration requires a methodology based upon the existence of an adiabatic point somewhere along the fin between the prime surfaces. Once the location of this adiabatic point is known, the cold plate may be treated on the basis of two isolated surfaces having first with adiabatic tips. The goal of this thesis is to provide design analysis and performance predictions for the Hot Primary Heat Exchanger (HPX) using numerical analysis of the tube and fin arrangement of the HPX.

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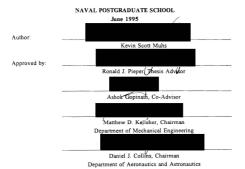
A DESIGN AND PERFORMANCE ANALYSIS FOR THE HOT PRIMARY HEAT EXCHANGER (HPX) USING NUMERICAL ANALYSIS

Kevin S. Muhs Lieutenant, United States Navy B.S., University of Washington, 1987

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MECHANICAL ENGINEERING MASTER OF SCIENCE IN ASTRONAUTICAL ENGINEERING

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ABSTRACT

The Hot Primary Heat Exchanger (HPX), a key component of the ThermoAcoustic Life Sciences Refrigerator, consists of a tube and fin design. The tubing is bent into a serpentine pattern and overlayed on a screen of copper fins. The serpentine pattern results in several flow reversals and complex internal flow geometries within the heat exchanger. The fins are not consistently of uniform length and generally have heat rejection at both ends. This design results in a forced-cooled, single stack cold plate configuration with unequal temperatures at each end of the fin. The analysis of this configuration requires a methodology based upon the existence of an adiabatic point somewhere along the fin between the prime surfaces. Once the location of this adiabatic point is known, the cold plate may be treated on the basis of two isolated surfaces having fins with adiabatic tips. The goal of this thesis is to provide design analysis and performance predictions for the Hot Primary Heat Exchanger (HPX) using numerical analysis of the tube and fin arrangement of the HPX.

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LIST OF SYMBOLS, ACRONYMS, AND/OR ABBREVIATIONS

ROMAN LETTER SYMBOLS

A	area of heat flow path
b	fin height [m]
C	specific heat capacity [kJ/kg-K]
d	diameter [m]
h	heat transfer coefficient [W/m2-K]
K	node conductance matrix
K	elements of the matrix K
k	thermal conductivity [W/m-K]
L	length of channel (fin length) [m]
ΔL	length between conductance nodes [m]
m ·	fin performance factor [m]
n	number of fins
Nu	Nusselt number [dimensionless]
P	wetted perimeter [m]
Pr	Prandtl number [dimensionless]
q	heat flow [W]
R	radius [m]
Re	Reynolds number [dimensionless]
Re	temperature excess ratio [dimensionless]
T	temperature [°C]
ΔT	temperature difference [°C]
t	elements of the temperature matrix T
w	weight flow [kg/hr]
Y.	thermal admittance [W/K]

GREEK LETTER SYMBOLS

β	a linear transformation matrix
Υ	element of the matrix Γ
ŕ	a linear transformation matrix
ð	fin width or thickness [m]
ē	temperature excess [K]
Δ	$\Lambda = e^{nb}$
14	dynamic viscosity
τ	element of the matrix β

SUBSCRIPTS

a	designates	fin tip '.	
avg	designates	average	
b	designates	fin base	
C	designates	cross-sectional area	
cond	designates	heat flow due to conductivity	
conv		heat flow due to convection	
e		effective diameter	
e f	designates	fin surface	
F	designates	fluid quantities	

ideal designates ideal values
in designates input condition
inner designates input rondition
max designates maximum quantity
o designates characteristic value
designates outer radius
p designates prime surface
designates surface area

ACRONYMS

CPX Cold Primary Heat Exchanger
EHX Experimental Heat Exchanger
HPX Hot Primary Heat Exchanger
IRE Insulated Refrigeration Enclosure
TALSR ThermoAcoustic Life Sciences Refrigerator

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Thanks to one and all, and thanks to the Lord who has given me
the privilege of knowing and working with each of the
aforementioned individuals.

I. INTRODUCTION

The Hot Primary Heat Exchanger (HPX), a key component of the ThermoAcoustic Life Sciences Refrigerator (TALSR), consists of a tube and fin design. The tubing is bent into a serpentine pattern and overlayed on a screen of copper fins. This configuration results in several flow reversals and complex internal gas side flow geometries within the heat exchanger. The fins are not consistently of uniform length and generally have heat rejection at unequal temperatures on each end of the fin. This design results in a forced-cooled, single stack cold plate configuration. The TALSR uses forced convection with an acoustic oscillator providing internal flow through channels created within the configuration of the HPX.

The first formal analyses of the cold plate configuration was provided by Mark and Stephenson (1954) and Kraus (1961). These analyses provided expressions for the efficiency of the cold plate for the case of heat loading on one side. Subsequently, Kern and Kraus (1972) looked at the single stack cold plate with heat input on only one, and on both sides. Incropera and Dewitt (1981) presented a classical textbook culmination of extended surface research and general conduction analysis for fins of uniform cross-sectional area. An application of extended surface principles and research was used by Garrett (1992) to evaluate the forced convective thermal performance of the HPX. Most recently, Pieper and

Kraus (1995) looked at the cold plate configuration with asymmetric heat loading and proposed dividing the plate into two fins, each possessing an adiabatic tip for analysis purposes. This permits a more accurate representation of the performance of the cold plate configuration.

The goal of this thesis is to utilize the results of Pieper and Kraus (1995) to provide design analysis and performance predictions for the Hot Primary Heat Exchanger (HPX) using a numerical optimization of the serpentine tube and fin arrangement in the HPX.

The serpentine pattern of the copper tubing in the HPX is unique when compared to a majority of the tube and fin heat exchangers currently in use. A vast majority of current applications involve parallel fluid flow in tubes through a matrix of fins to provide the required heat transfer. This results in fairly uniform base temperatures at each end of the fin. In contrast, the serpentine tubing in the HPX results in non-uniform base temperatures due to increasing temperatures along the length of the tube. Research into the thermal performance of a non-uniform base temperature design is limited and on-going, however, a successful application of this configuration has been achieved on a large scale at the WyoDak energy facility in cillete Wyoning, shown in Figure 1.

Chapter II of this thesis is used to present fundamental heat transfer concepts, and extended surface evaluation techniques. Chapter III provides a physical description of the ThermoAcoustic Life Sciences Refrigerator (TALSR) and discusses the role of the Hot Primary Heat Exchanger in the heat transfer cycle of the TALSR. Chapter IV details the numerical simulation techniques used in the performance analysis of the HPX. Chapter V presents a discussion on efficiency modeling and the factors affecting extended surface efficiencies. Analysis results and conclusions are presented in Chapters VI, and VII respectively.

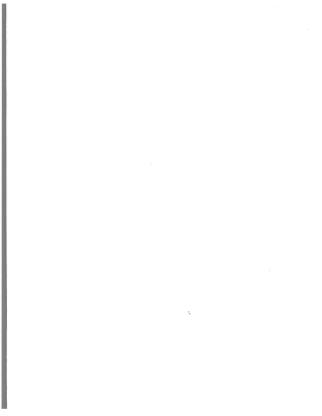






Figure 1: WyoDak Energy Facility in Gillete Wyoming



II. HEAT TRANSFER FROM EXTENDED SURFACES

The convective heat transfer rate of a bare surface may be increased by increasing the surface area through which the convection occurs. This may be accomplished by using surfaces that extend from the bare surface into the surrounding fluid. Naturally, a considerably larger amount of heat can be transferred from or to an extended surface in a given time period than from or to a bare surface. The type of extended surface most commonly used, is termed a fin. The thermal conductivity of the fin material has a strong effect on the temperature distribution along the fin and therefore influences the degree to which the heat transfer rate is enhanced.

A. BASIC HEAT TRANSFER CONCEPTS

Conduction is the heat flow mechanism whereby heat is transferred by molecular diffusion from one part of a medium under the influence of a temperature gradient without a net displacement of the particles that compose the medium. It was Fourier who proposed that the heat flow is directly proportional to the area of the heat flow path and the temperature gradient along the path,

$$q \propto A(dT/dx)$$
 (2.1)

Insertion of a proportionality constant yields:

$$q_{cond} = -kA(dT/dx)$$
 (2.2)

where,

A = area of the heat flow path

k = thermal conductivity of the material

(dT/dx) = change in temperature per unit length

The minus sign assures a positive heat flow in the presence of the required negative temperature gradient.

Convection is a fluid flow process that results in the transfer of heat from or to a confining surface by a flowing fluid. The fluid flow may be induced by buoyancy, density gradients or through the use of mechanical methods. Those methods utilizing mechanical flow generation are termed forced convection.

A second classification of convective heat transfer is as either internal or external. In internal flow the fluid is constrained on all sides by solid boundaries, as in flow through a pipe. In external flow the fluid has at least one side extending to infinity without encountering a solid surface. Heat flow during convection is directly proportional to the temperature difference between the confining surface and the surface area over which the process takes place:

Insertion of a proportionality factor yields,

$$q_{conv} = hA \Delta T$$
 (2.4)

Equation (2.4) is Newton's law of cooling and h is called the convection heat transfer coefficient and encompasses all the effects that influence the convection mode.

B. FIN CONCEPTS

To determine the heat transfer rate associated with a fin, the temperature distribution along the fin must first be obtained. In the temperature distribution analysis, some standard assumptions are made. First, radiation effects are neglected. In addition, the fin is assumed to comply with the well known Murray (1938) and Gardner (1945) assumptions listed in Appendix A. The one dimensional assumption of Murray-Gardner is valid because in most extended surface applications the fins are relatively very thin compared to their height. Thus, the temperature changes in the longitudinal direction are much larger than those in the transverse direction and the one dimensional assumption is satisfactory. The material used in the construction of the fin is characterized by a thermal conductivity, k. It is also assumed that the heat transfer coefficient due to convection, h, is known. Thus, following the standard, steady state fin characterization of Incropera and Dewitt (1981), it is found that;

$$(k) d(A_{-}(x) dT/dx)/dx - (h) (dA_{+}(x)/dx) (T - T_{+}) = 0$$
 (2.5)

where A is the cross-sectional area, and A is the surface

area, both of which may vary with x. Equation (2.5) may be simplified by defining a temperature excess, θ , as,

$$\theta(x) = T(x) - T_{\bullet}$$
 (2.6)

where because T_{-} is a constant, $d\theta/dx = dT/dx$. Substituting Equation (2.6) into Equation (2.5), results in;

$$(k) d(A_{-}(x) d\theta(x) / dx) / dx - (h) (dA_{-}(x) / dx) \theta(x) = 0$$
 (2.7)

To determine the temperature distribution along the length of an individual fin, it is necessary to solve Equation (2.7) for the specific fin geometry.

For the case of an individual rectangular fin of length b, as shown in Figure 2, consider that the origin of the coordinate is at the fin tip with positive orientation toward the fin base. The fin width is a constant, δ , therefore λ_c is a constant and $\lambda_s = Px$, where λ_c is the surface area measured from the tip to x and P is the fin perimeter. Thus, $(d\lambda_c/dx) = 0$ and $(d\lambda_b/dx) = P = (2L + 2\delta) - 2L$ and Equation (2.7) reduces to;

$$d^{2}\theta/dx^{2} - m^{2}\theta = 0 {(2.8)}$$

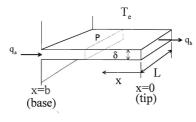


Figure 2: Rectangular longituidinal fin of length b.

where

$$m^2 = 2h/k\delta (2.9)$$

Equation (2.8) is a linear, homogenous, second-order differential equation with constant coefficients. Its general solution is of the form:

$$\theta(x) = C_1 e^{\pi x} + C_2 e^{-\pi x}$$
 (2.10)

By substitution, it is easily verified that Equation (2.10) is a solution to Equation (2.8).

To evaluate the constants \mathbf{C}_1 and \mathbf{C}_2 of Equation (2.10), it is necessary to specify initial value data;

$$\theta(x = b) = \theta_b$$

and

$$q(x = b) = q_b$$

This makes

$$\theta_b = C_1 e^{mb} + C_2 e^{-mb}$$
 (2.12)

and applying $q_b = kA(d\theta_b/dx)$ gives

$$q_b = k\delta mL[C_1e^{nb} - C_2e^{-nb}]$$
 (2.13)

or

$$q_b = Y_o[C_1e^{nb} - C_2e^{-nb}]$$
 (2.14)

where $Y_{\circ} = k\delta mL$, is called the characteristic thermal admittance of the fin and has the units W/°C.

It is then a matter of algebra to evaluate the constants C_1 and C_2 such that;

$$\theta(x) = \theta_b \cosh(m[b-x]) - (q_b/Y_o) \sinh(m[b-x]) \qquad (2.15)$$

and

$$q(x) = \theta_b Y_o \sinh(m[b-x]) + q_b \cosh(m[b-x]) \qquad (2.16)$$

Now that the temperature excess and heat flow at any point in the fin have been evaluated, a convenient method of mapping conditions at the fin tip to conditions at the fin base is desired.

For individual fins, Kraus et al. (1978) showed that conditions of heat flow and temperature excess (relative to the presumed constant and uniform temperature environment) at any point on a fin are induced by similar conditions at the fin base. This resulted in the development of a linear transformation that mapped conditions at the fin tip to conditions at the fin base:

$$\begin{bmatrix} \theta_b \\ q_b \end{bmatrix} = \beta \begin{bmatrix} \theta_a \\ q_a \end{bmatrix} = \begin{bmatrix} \tau_{11} & \tau_{12} \\ \tau_{21} & \tau_{22} \end{bmatrix} \begin{bmatrix} \theta_a \\ q_a \end{bmatrix} \tag{2.17}$$

where the matrix β is called the inverse thermal transmission matrix. Its elements are designated as the inverse thermal transmission parameters. A summary of this work is provided in Appendix B.

Applying the development of Kraus et al. (1978) to the rectangular fin of Figure 2, it is seen that the inverse thermal transmission matrix is given by

$$\beta = \begin{bmatrix} \cosh mb & (Z_o) (\sinh mb) \\ Y_o (\sinh mb) & \cosh mb \end{bmatrix}$$
 (2.18)

where $Y_{\alpha}=(2hk\delta)^{1/2}L$, $Z_{\alpha}=1/Y_{\alpha}$, and k, L, h, and δ are the thermal conductivity, fin length, heat transfer coefficient, and fin thickness respectively. Thus, this matrix can be used to map conditions at the fin tip to conditions at the fin base

$$\begin{bmatrix} \theta_b \\ q_b \end{bmatrix} = \begin{bmatrix} \cosh mb & (Z_o) \left(\sinh mb \right) \\ Y_o \left(\sinh mb \right) & \cosh mb \end{bmatrix} \begin{bmatrix} \theta_s \\ q_s \end{bmatrix}$$
 (2.19)

In addition to developing the linear transformation matrices, Kraus et al. (1978) also proposed that the conventional fin efficiency be abandoned and that single fins be characterized by a single parameter called the thermal transmission ratio, the ratio of the heat entering the fin to the temperature excess at the base of the fin. This was later called the fin input admittance [Kraus (1982)] and was given in the form of a bilinear transformation;

$$Y_{in} = q_b/\theta_a = (\tau_{21} + (q_a/\theta_a)\tau_{22})/(\tau_{11} + (q_a/\theta_a)\tau_{12})$$
 (2.20)

The fin input admittance is particularly useful in the analysis and evaluation of finned arrays and will play an important role in the analysis of the HPX.

C. FIN ANALYSIS WITH AXISYMMETRIC HEAT LOADING

Consider the forced cooled cold plate shown in Figure 3 and observe that the single fin of total height b has been subdivided into two fins with fin heights b_1 and b_2 , to allow for the fact that the temperature differences at its opposite ends may not be equal. Note that the temperature excess, θ , is defined as the difference between the temperature at any point on the fin, T, and the temperature of the coolant fluid, $T_{-\nu}$, as given in Equation (2.6).

As shown in Figure 3, the origins of the fin height coordinates, \mathbf{x}_1 and \mathbf{x}_2 , are taken at the tips of fin 1 and fin

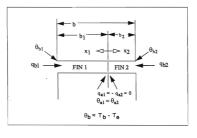


Figure 3: Forced cooled cold plate configuration used in axisymmetric heat loading analysis

2 with a positive orientation from fin tip to fin base. The fin heights, b; and b2, are chosen such that no heat crosses the interface between fin 1 and fin 2, thus creating an adiabatic fin tip condition. This is characterized by a linear transformation of Equation (2.19) for the longitudinal fin of rectangular profile shown, given by;

and

$$\begin{bmatrix} \theta_{b2} \\ q_{b2} \end{bmatrix} = \begin{bmatrix} \cosh mb_2 & Z_o(\sinh mb_2) \\ Y_o(\sinh mb_2) & \cosh mb_2 \end{bmatrix} \begin{bmatrix} \theta_{a2} \\ q_{a2} \end{bmatrix}$$
 (2.22)

The cold plate configuration of Figure 3 is subject to the continuity and compatibility conditions at the interface between fins 1 and 2. These conditions require an adiabatic interface between b, and b, and are given in matrix form as;

$$\begin{bmatrix} \theta_{a1} \\ q_{a2} \end{bmatrix} = \begin{bmatrix} \theta_{a2} \\ -q_{a2} \end{bmatrix} = \begin{bmatrix} \theta_{a} \\ 0 \end{bmatrix} \tag{2.23}$$

If $\theta_{b1} \neq \theta_{b2}$, symmetry will not apply and the fin height s b_1 and b_2 will not be equal $(b_1 \neq b_2)$.

In order to determine fin lengths b_1 and b_2 , Equations (2.21) and (2.22) may be expanded using the conditions of Equation (2.23). In particular with $\theta_{a1}=\theta_{a2}=\theta_a$, the following equations are derived.

$$\theta_{b1} = [\cosh mb_1]\theta_a \qquad (2.24)$$

$$\theta_{b,2} = [\cosh mb,]\theta,$$
 (2.25)

Equation (2.24) and Equation (2.25) show that the base temperature excesses for b_1 and b_2 are related through θ_a , thus, a temperature excess ratio (R_0) for a given cold plate configuration may be defined as:

$$R_{\theta} = \theta_{b1}/\theta_{b2} = [\cosh mb_1]/[\cosh mb_2] \qquad (2.26)$$

The hyperbolic cosines of Equation (2.26) can also be represented as exponentials;

$$R_a = (e^{mb1} + e^{-mb1})/(e^{mb2} + e^{-mb2})$$
 (2.27)

Using the observation from Figure 3, that $b_2 = b - b_1$, it is a matter of algebra to show that;

$$R_a = (\Lambda^2 + e^{2\pi(b2)})/(\Lambda[e^{2\pi(b2)} + 1])$$
 (2.28)

where

$$\Lambda = e^{\pi b} \qquad (2.29)$$

The value of b_2 for a given value of R_θ can then be found by re-arranging Equation (2.28) to provide;

$$b_2 = (1/2m) (ln[\Lambda(\Lambda - R_0)/(R_0\Lambda - 1)])$$
 (2.30)

An evaluation of R_0 using Equation (2.30) confirms that if R_0 =1 because $\theta_{01} = \theta_{02}$, then because of symmetry, b_z must equal half of the total fin height. In addition , the value of R_0 for b_z =0 can be found directly from Equation (2.28),

$$(R_0)_{\text{max}} = (\Lambda^2 + 1)/(2\Lambda)$$
 (2.31)

and similarly for b2=b,

$$(R_0)_{min} = (2\Lambda)/(\Lambda^2 + 1)$$
 (2.32)

If R₆ is not within the domain of values specified by Equations (2.31) and (2.32) the fin is then treated as a single fin without an adiabatic point. However, for the HPX model, the R₆ values are always within this domain and the single fin analysis is not required.

Once b_2 is known, b_1 is easily found through a simple subtraction procedure $(b_1 = b - b_2)$. With both b_1 and b_2

known, the cold plate may be treated on the basis of two isolated surfaces having fins with adiabatic tips, treating each fin individually as though the other were not present. One surface is governed by b, with $\theta_{\rm si}$ specified, and the other is governed by b, with $\theta_{\rm si}$ specified. Thus, there are two entities, each with a prime surface and each with a fin, and these surfaces may be treated individually as if the other were not present.

The performance of each prime surface, and fin $(b_1 \text{ or } b_2)$ combination depends on the total input admittance of the pair. The total input admittance, $Y_{1:0}$, is just the sum of the prime surface and fin input admittances,

$$Y_{in} = Y_{in,p} + Y_{in,f}$$
 (2.33)

where the subscripts, p and f refer to the prime surface and the fin, respectively, and where both prime and fin base surfaces are operating at θ_b .

The prime surface input admittance is determined by its convective dissipation

$$Y_{in,p} = hS_p \qquad (2.34)$$

where as seen from Figure 4,

$$S_p = (W - \delta)L$$
 (2.35)

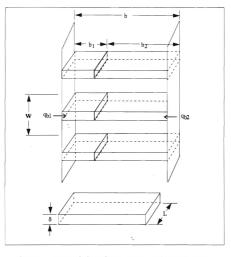


Figure 4: Schematic of single stack, cold plate heat transfer geometry.

which accounts for the footprint occupied by the fin.

The fin input admittance is derived from the fin β -matrix given by Equation (2.18). Because the height b_2 is based upon the determination of an adiabatic point, $Y_{in,f}$ is established by realizing that for $q_a = 0$ Equation (2.20) becomes;

$$Y_{in} = q_b/\theta_a = \tau_{21}/\tau_{11} = Y_o \sinh(mb)/\cosh(mb)$$
 (2.36)

which for the fin governed by b2, becomes

$$Y_{in.f} = Y_o \tanh(mb_2)$$
 (2.37)

Then, if the temperature excesses are specified so that R_{θ} leads to the establishment of b_{z} , the heat dissipation is obtained from;

$$q_b = Y_{in}\theta_b \qquad (2.38)$$

This section provides the basis for an accurate thermal performance model needed in the simulation of the heat transfer process in the TALSR discussed in the next chapter.

III. THE THERMOACOUSTIC LIFE SCIENCES REFRIGERATOR

The ThermoAcoustic Life Sciences Refrigerator (TALSR), developed at Naval Postgraduate School, was motivated by the desire to replace the Freon 512 vapor compression refrigeration system currently used on board the Space Shuttle. The TALSR provided a safer alternative due to the fact that it does not use chlorofluorocarbons (CFCs) and therefore could not potentially contaminate the small confined area of the Space Shuttle. In addition, the TALSR also provides the potential for higher reliability, over the current system, because it has no sliding seals and thus requires no lubrication. The ThermoAcoustic Life Sciences Refrigerator uses a complex thermal transport subsystem to remove heat from the Insulated Refrigeration Enclosure (IRE) of the Space Shuttle.

A. THERMAL SYSTEMS OVERVIEW

Heat is removed from the IRE by a Liquid-Air Heat Exchanger fabricated by the Modine Manufacturing Company. It is then transported through two thermoacoustic heat pumps, connected in series, by a mechanically pumped cold heat exchange fluid. The internal architecture of each heat pump consists of a Cold Primary Heat Exchanger (CPX), a Hot Primary Heat Exchanger (HPX), and an Electrodynamic Driver. The Electrodynamic Driver acoustically oscillates an internal

working fluid in each heat pump thereby creating internal gas side flow for both the HPX and the CPX. It is known that the heat transfer between surfaces can be enhanced using longitudinal acoustic waves [Vainshtein (1995)]. This internal gas side flow is used by the Cold Primary Heat Exchanger to remove heat from the cold-side exchange fluid, and transport it to the HPX. The HPX then transfers the heat removed from the cold-side exchange fluid into a secondary cooling loop. This secondary cooling loop transports the heat to the internal environment of the Space Shuttle via an Experimental Heat Exchanger (EHX). A schematic diagram of the series fluid flow through the TALSR thermal transport subsystem is shown in Figure 5 [Garrett (1992)].

B. THE HOT PRIMARY HEAT EXCHANGER (HPX)

The Mot Primary Heat Exchanger uses an acoustically oscillating medium to transport heat and must therefore be analyzed differently from most compact heat exchangers. The most significant difference between standard compact heat exchanger analysis as the fact that the acoustically oscillating gas parcels only move a limited distance before reversing their direction of flow. The consequence of this periodic flow reversal is that an increase in the effective surface area for heat transfer cannot arbitrarily be achieved by simply increasing the length of the heat exchange surfaces (fins) in the direction of flow.

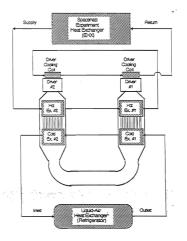
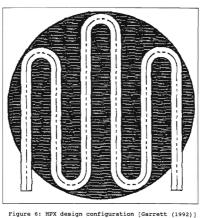


Figure 5: Schematic diagram of the series fluid flow through the Hot and Cold Primary Heat Exchangers. [Garrett (1992)]

Garrett (1992) has shown that the effective area over which heat transfer will take place is limited by the peak-to-peak excursions of the gas parcels over the heat exchange surface. Thus, heat exchange surfaces, which have a length in the flow direction equal to the peak-to-peak displacement of the gas, provide the maximum effective surface area for heat transfer.

The HPX utilizes copper tubing bent into a serpentine pattern and then soldered or furnace brazed on a screen of copper fins, as shown in Figure 6 [Garrett (1992)]. In this configuration, the fins are not of uniform length and for a majority of the fins, there is heat rejection at both ends. This design results in two parallel paths by which the fluid contained within the copper tubing can remove heat from the acoustically oscillating gas. The primary path is through the fins which are bonded to the tube. The fins represent the primary path because they have a greater surface area than the outside diameter of the tubing and because they are designed to have a length in the flow direction approximately equal to the peak-to-peak displacement of the gas. The secondary path is due to the direct convection of the gas around the tubing. This path also provides some useful heat transfer and requires consideration in the thermal analysis of the HPX. A schematic representation of the thermal resistances in the primary heat exchanger energy flow path is shown in Figure 7 [Garrett (1992)]. The tubing for the HPX is standard, circular crosssection, soft copper tubing, with an outer diameter (OD) of



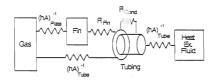


Figure 7: Schematic representation of thermal resistances in the HPX flow path. [Garrett (1992)]

0.635 cm and a wall thickness of 0.076 cm. The HPX has an inner diameter of 11 cm. Table 1 provides a list of the geometrical constraints and heat transfer characteristics used in the analysis of the HPX.

The physical design of the HPX can therefore be modeled as a forced-cooled, single stack cold plate configuration with unequal temperatures at each end of the fin. Thus, an analysis of the HPX can be completed using the derived relationships for cold plates with axisymmetric heat loading.

Symbol	Description	Value	Reference
C _p	specific heat capacity of water	4.182 kJ/kg-K	Incropera and Dewitt (1981)
δ	Fin thickness	0.0152 cm	Garrett (1992)
h _F	Fluid heat transfer coefficient	12600 W/m ² -K	Garrett (1992)
k	thermal conductivity of copper	401 W/m-K	Garrett (1992)
L	Fin width (channel length)	0.3175 cm	Garrett (1992)
Pr	Prandtl number	0.7068	Garrett (1992)
Re	Reynolds number	1900	Garrett (1992)
Rinner	Inner radius of copper tubing	0.2413 cm	Garrett (1992)
Router	Outer radius of copper tubing	0.3175 cm	Garrett (1992)
μ	mean dynamic viscosity	190 x 10 ⁻⁷ N-s/m ²	Incropera and Dewitt (1981)
μ,	surface dynamic viscosity	184 x 10 ⁻⁷ N-s/m ²	Incropera and Dewitt (1981)

Table 1: A summary of the physical constraints and heat transfer properties used in the analysis of the HPX

C. COMPUTER MODELING OF THE HEAT TRANSFER PROCESS

Once an accurate thermal model has been obtained, an efficient and reliable method of analyzing the heat transfer processes occurring within the heat exchanger is required. This is accomplished through the use of Steady State Thermal Analyzer software version 2.2 provided by InterCept Software. The model builder provides the user with the means to model the physical configuration of interest in order to provide the thermal analyzer with an input file. The thermal analyzer then takes the input file and produces an output file containing a summary of the temperatures within the configuration.

The model building process begins with a drawing of the configuration and a subdivision of it into small but finite subvolumes. Each subvolume is presumed isothermal and the centers of each subvolume are then representative of the entire subvolume. These centers are referred to as nodes and are connected to adjacent nodes through branches consisting of various forms of thermal conductance. These conductance forms are dependent on the mode of heat transfer between adjoining pairs of nodes. The various heat transfer modes available to the user include conduction, laminar free convection, radiation, forced convection, and fluid flow.

Each node can also be connected to a constant temperature, a constant heat input, or a temperature dependent heat input with an appropriate tag. Once a sketch representation of the nodalized model is complete, the comprehensive node connection data is ready to be input into the model builder program. The input for the model builder program begins with node 1, and the user is asked for information for each connecting node with a greater number. For each connection to an adjacent node, the user must specify the mode of heat transfer with a tag number. After specifying the connecting node and tag, the user is queried as to the whether the conductance will be calculated, input directly, or is the same as an earlier branch. Conductance values are required for each node connection to any higher number node.

Subsequent use of the thermal analysis software results in the writing of n node equations in n unknown temperatures where the nodes are connected by the appropriate thermal conductances. The general solution strategy for these n equations is to then use the nodal conductances of the model to form a set of heat balance equations. In matrix form, this set of heat balance equations has the general form;

$$[K]$$
 $[T]$ = $[B]$ (3.1)

where ${\bf X}$ is the matrix of conductances, ${\bf T}$ is the node temperatures, and ${\bf B}$ is a matrix composed of constant temperature heat sinks, and/or heat inputs. Many of the conductances are linearized forms of nonlinear expressions for heat transfer by natural convection and other similar heat

transfer modes, therefore, the various terms in the K matrix may themselves be functions of temperature. Solution of the T matrix therefore, must be by iteration. Node temperatures obtained after each iteration are used to update the temperature dependent terms in the K matrix. The thermal analyzer uses a Cholesky factorization [Hamming (1973)] of the K matrix to perform this iteration. This iterative solution continues until the change in nodal temperatures between successive iterations is smaller than a user-specified error criteria. Once the iterative solution is obtained, the thermal analyzer writes the temperatures to an output file, where they can be read and analyzed by the user.

IV. PERFORMANCE ANALYSIS

The thermal analysis of the TALSR requires an adequate model capable of determining both the heat transfer characteristics for the complex flow geometries within the HPX, and the values of temperature along the serpentine pattern of the copper tubing. The thermal conductivity of copper, k, the fin thickness, δ , and the channel length, L, are all easily determined from the given material and geometrical considerations of the HPX. Therefore, to complete the thermal analysis, the convection coefficient, h, is required to determine the total input admittance, and the conductance matrix is needed to map base temperature excesses along the length of copper tubing. These remaining values are determined using numerical analysis techniques.

A. HOT PRIMARY GAS SIDE HEAT TRANSFER COEFFICIENT DETERMINATION

The convection heat transfer coefficient, h, encompasses all the effects that influence the convection mode. It depends on conditions in the boundary layer, which are influenced by surface geometry, the nature of fluid motion and many of the fluid thermodynamic and transport properties. By considering the magnitude of the factors affecting the heat transfer coefficient, h, an appreciation for the complexity in determining its value is obtained. In simple flow situations, solutions for h are readily effected mathematically, however,

for situations of complex flow geometries, such as those in the TALSR, the more practical approach involves calculating h from empirical equations. The particular form of these equations is obtained by correlating measured convection heat mass transfer results in terms of appropriate dimensionless groups. The development of the dimensionless group used to determine h was performed by Incropera and Dewitt (1981), and resulted in the derivation of the Nusselt number (Nu). The dimensionless Nusselt number provides a measure of the convective heat transfer occurring at the surface. For a prescribed geometry, the Nusselt number is a universal function of x', the Reynolds number, and the Prandtl number, where x is the dimensionless length of the fluid along the channel. A detailed analysis of these factors will determine the exact correlation to be used in determining the For the given flow geometry and Nusselt number. considerations of the HPX, the Reynolds number is given by Garrett (1992) to be 1900, therefore, flow through the coolant channel remains in the laminar region. In the absence of strict correlations for oscillatory flow convection coefficients, a steady flow Nusselt correlation was assumed to provide a suitable representation of heat transfer in the channel. Sieder and Tate (1936) proposed a suitable correlation for laminar flow in tubes and ducts $(\lceil (Re_0PrD/L)^{1/3}) (\mu/\mu_*)^{0.14} \rceil \ge 2)$ given by;

$$Nu = 1.86 (RePr/(L/D))^{1/3} (\mu/\mu_*)^{0.14}$$
 (4.1)

where μ and μ , are the average dynamic viscosity and the surface dynamic viscosity respectively. From knowledge of the Nusselt number, the convection coefficient may now be found using;

$$Nu = (hd_{\bullet}/k_{F}) \tag{4.2}$$

where d_* is the effective diameter of a non-circular duct through which the fluid passes. Replacing D with d_* in Equation (4.1) and combining with Equation (4.2) results in

$$h = (Nu(k_F)/d_e) = (1.86k_F/d_e) (RePr/(L/de))^{1/3} (\mu/\mu s)^{0.14}$$
 (4.3)

Then using the values of L, Re and Pr specified in Table 1, and realizing that for air $(\mu/\mu_s)^{0.14}$ - 1 over the temperature range of interest for the HPX it is easily shown that;

$$h = (7.9 \times 10^{-3})/d_e^{2/3}$$
 (4.4)

where h is given in Watts/cm²-K. The effective diameter, $d_{\rm e}$, is defined as;

$$d_e = (4A_e/P)$$
 (4.5)

where λ_c and P are the flow cross-sectional area and the wetted perimeter respectively. A rectangular duct flow geometry is assumed for the TALSR based on the large radius of curvature of the HPX and the small spacing between fins, thus as shown in Figure 4:

$$d_n = 2zb/(b + z)$$
 (4.6)

where $z = (w - \delta)/2$, and $b = b_1 + b_2$. The value of b varies by location within the HPX, as shown in Figure 5, and results in corresponding changes in the convection coefficient for each location. Therefore the value of h in Equation (4.4) must be considered independently for each location along the copper tubing. This significantly increases the complexity of the analysis.

B. TEMPERATURE EXCESS DETERMINATION

Determination of temperature excess variation with location along the length of copper tubing is also required to adequately complete the analysis of the TALSR. An accurate model of the heat transfer processes shown in Figure 7 is required to determine this variation.

Application of the model builder program THANSS, located within the Steady State Thermal Analyzer software, to the TALSR is accomplished by dividing the length of the copper tubing surface into 144 subvolumes of varying size based on

location. Additionally, another 144 nodes are assigned to corresponding fluid nodes within the pipe to account for variations in fluid temperature as it flows through the tubing. A summary of nodal assignments based on location is given in Appendix C. An additional two nodes are required to complete the model. The first node, a constant heat source node, is assigned to the air flowing through the coolant channels created by the tube and fin design. The temperature of the air is considered uniform and constant at 40°C. The second node is used to represent the liquid input temperature at the inlet to the HPX. This temperature is also assumed uniform and constant at a temperature of 25°C.

The general form of the heat flow equations used for all modes of heat transfer considered within the HPX is;

$$q = K(T_1 - T_2)$$
 (4.7)

where K, the conductance, varies in form depending on the mode of heat transfer considered. For the HFX model, four forms of thermal conductance are required to define the various modes of heat transfer occurring within the HFX.

The first conductance is represented as K_1 and is given by:

$$K_1 = kA_c/\Delta L \qquad (4.8)$$

where k is the thermal conductivity, A_c is the cross sectional area, and aL is the length between adjacent nodes. This conductance is used to define heat flow between adjacent nodes on the surface of the copper tubing, therefore, the cross sectional area available for heat transfer, A_c , is given by:

$$A_c = \pi (R^2_{outer} - R^2_{inner}) = 0.134 \text{ cm}^2$$
 (4.9)

The thermal conductivity of copper (k = 401 W/m-K) was used for all calculations involving K_1 .

The second conductance is used in the calculation of the convective heat transfer between nodes on the surface of the copper tubing and corresponding liquid nodes located within the copper tubing. It is denoted as K_{ν} and is given as:

$$K_2 = h_a A_a$$
 (4.10)

where h_{ν} is the convective heat transfer coefficient due to water flow through the tube, and A_{ν} is the surface area over which the heat transfer occurs. The given value of h_{ν} for turbulent water flow through the tube is given by Garrett (1992) as 12600 W/m²-K. The surface area over which the heat transfer occurs is based on the inner radius of the copper tubing and is given by:

$$A_{\bullet} = 2\pi R_{inner} \Delta L \qquad (4.11)$$

where aL is identical in value to that used in determining K1.

The third conductance form, K_3 , is used in the determination of the convective heat transfer between adjacent fluid nodes within the tube. It is given as:

$$K_1 = W_F C_F$$
 (4.12)

where w_f is the fluid weight flow and c_f is its specific heat capacity. This value was calculated for a variety of flow rates ($w_f = 68 \text{ kg/hr}$, 149.7 kg/hr, 272.2 kg/hr, 362.9 kg/hr) through the tubes, and the thermal performance of each flow rate was analyzed. A constant value of 4.182 kJ/kg-K was used for the specific heat capacity of water in all calculations of K,

The fourth conductance term necessary to analyze the thermal model is used in the calculation of the heat transfer from the surface of the tubing, to the surrounding environment via both the prime and fin surfaces. This term is the most difficult of the conductance forms to determine, and requires a return to the principles presented in the single stack cold plate analysis. Equation (2.33) is written in the form of the general heat equation used by the thermal analysis software in its calculations where:

$$K_4 = Y_{in} = Y_{in,p} + Y_{in,f}$$
 (4.13)

and

$$\theta_a = (T_a - T_e) = (T_1 - T_2)$$
 (4.14)

Therefore, the fourth conduction term is the sum of the prime surface and fin input admittances, and the temperature difference is given in terms of a temperature excess at the base of the fin. Applying this conductance form to the HPX requires consideration of the length, aL, between adjacent nodes. The length between adjacent nodes determines both the number of fins, and the amount of prime surface associated with each node. The aL in the analysis model is varied with location along the copper tubing as shown in Appendix C. Once aL is determined, the resulting number of fins, n, and prime surface area may be used with the determined value of h to give;

$$K_4 = hn(W - \delta)L + nY_0 tanh(mb_2)$$
 (4.15)

where $n = \Delta L/W$.

Once the model provides the required data to satisfy the K-value equations, the solution of the thermal conductance matrix is straightforward and ideally suited to a spreadsheet application. The calculated K-values are then used as input to the thermal analyzer to form a series of node connection data. The spreadsheet calculations and resulting node connection data for each case considered is provided in Appendix D. In the HPX model, the tube water inlet temperature and the oscillating air temperature are assigned constant values. Additionally, as mentioned earlier, 144 nodes were assigned to locations along the copper tubing (nodes 1-144) and 144 corresponding nodes (nodes 145-288) were assigned to the centerline liquid temperature within the tubing.

In the initial development, it was assumed that all fin pairs were shared equally ($\theta_{b1} = \theta_{b2}$). This condition is the easiest to model, because fin sharing node pairs have equivalent values of K_i assigned to them. This model results in the assigning of 46 distinct K-values and is used in the establishment of the initial temperature excess to be used in subsequent iterations. The computed temperature excess variation with location was then used in the calculation of the nodal fin sharing pair R_0 values using Equation (2.26). Once the R_0 values were known, the values of b_2 and b_1 were calculated using Equation (2.30). The assignment of specific, non uniform fin lengths (b_1 , b_2) along the tubing surface, required the value of K_1 to be modified for each node. This was required based on the fact that now unique values of Y_{10,F_0} existed for each node. Applying the K-value equations to each

node, for this model, resulted in the generation of 252 unique values of K_1 . These values were then entered into the thermal analysis program. The thermal performance for a variety of flow rates (\mathbf{w}_r = 68 kg/hr, 149.7 kg/hr, 272.2 kg/hr, 362.9 kg/hr) was also analyzed for this new model. These analyses provided adequate data for a performance prediction of the TALSR.

V. EFFECTS OF TEMPERATURE EXCESS RATIO VARIATIONS

The base temperature excess (θ_o) , as defined earlier, is the difference between the temperature at the base of the fin and the temperature of the coolant fluid, given by:

$$\theta_b = T_b - T_m \tag{5.1}$$

It represents the maximum driving potential for convective heat transfer across the fin. Hence, the maximum rate at which a fin could dissipate energy is the rate that would exist if the entire fin surface were at the base temperature. However, because any fin is characterized by a finite conduction resistance, a temperature gradient will exist along the fin and the rate of energy dissipation will be less than the maximum rate. Thus, a convenient measure for the thermal performance of a particular fin is provided by the fin efficiency, η , defined as [Incropera and DeWitt (1981)];

$$\eta = q_f/q_{ideal}$$
 (5.2)

where

$$q_t = q_b = Y_0\theta_b \tanh(mb_2)$$

 $q_{ideal} = hPb\theta_b$ (5.3)

for a rectangular fin of uniform cross sectional area with an

adiabatic tip. The equation for $q_{i,oss1}$ represents the heat convectively transferred from a fin of height b to the environment if $\theta=\theta_0$ at all points along the fin. Combining Equations (5.2) and Equation (5.3) results in a conventional fin efficiency given as;

$$\eta = \tanh(mb)/mb \tag{5.4}$$

where m is as given in Equation (2.9), and b is the total height of the fin. The application of this parameter to cold plates with asymmetric heat loading, such as those modeled in the HPX, will result in individual efficiencies being identified for each fin subdivision (b; and b;). In addition, an overall efficiency for the total fin height b is also calculable.

A simplified cold plate configuration will be used as the model for this analysis in order to provide clarity to the development. The model will consist of a single fin with a total height b, and known heat transfer characteristics for the surrounding flow geometry. Therefore, the only required data to complete the thermal analysis of the model is the prime surface temperature on either end of the fin. Once this value is known, R₀, b₁ and b₂ are easily determined using Equations (2.26) through (2.28).

A conventional derivation of the efficiencies for each fin subdivision is easily determined by substituting the values of b_1 and b_2 in for the total fin height, b, in Equation (5.3). A conventional overall efficiency of the entire fin height, b, can also be calculated using

$$\eta_{\text{overall}} = (q_{\text{actualb1}} + q_{\text{actualb2}}) / (q_{\text{idealb1}} + q_{\text{idealb2}}) \tag{5.5}$$
 which algebraically reduces to

$$\eta_{\text{oversll}} = \eta_{\text{bl}}/(1 + (b_2/b_1R_0)) + \eta_{\text{b2}}/(1 + (b_1R_0/b_2))$$
 (5.6)

The value of R_0 used in determining Equation (5.6) is based upon the average temperature change across the fin as given by

$$R_6 = (\Delta T/2 + T_{avg} - T_e)/(-\Delta T/2 + T_{avg} - T_e)$$
 (5.7)

where

$$\Delta T = (T_{b1} - T_{b2})$$

$$T_{avg} = (T_{b1} + T_{b2})/2$$
(5.8)

The use of this definition for R_{θ} , contrary to one based solely on $T_{\theta 1}$ or $T_{\theta 2}$, provides an accurate representation of the response in fin efficiency due to variations in base temperature excess across the fin.

These variations in fin efficiency were then plotted versus the difference in base temperature excesses as shown in Figure 8.

A more practical definition for fin efficiency would result in the efficiency of each segment increasing with the

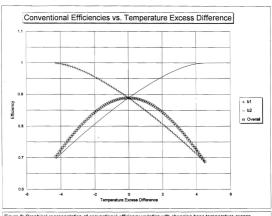


Figure 8: Graphical representation of conventional efficiency variation with changing base temperature excess difference

length of the respective fin heights. For this development the overall efficiency is defined as

$$\eta_{\text{overall}} = \eta_1 + \eta_2 \tag{5.9}$$

where η_1 and η_2 are given by

$$\eta_i = q_{fi}/q_{ideal} = Y_o\theta_{bi} \tanh(mb_i)/q_{ideal}$$
 (5.10)

and i = 1 or 2. The value of $\mathbf{q}_{\text{lowal}}$ for this development is given as

$$q_{ideal} = hPb\theta_{bi}$$
 (5.11)

where θ_{bi} is chosen as the maximum value of the magnitude of either θ_{bi} or θ_{b2} . For example, for $R_{\theta} \ge 1$ it follows from Equation (5.11) that $q_{\text{boss}} = \text{hPb}\theta_{\text{b1}}$. After substitution of this result into Equation (5.10) and combining with Equation (5.11), it is found that for $R_{\theta} \ge 1$ overall efficiency is given as

$$\eta_{overell} = (tanh(mb_1)/(mb)) + (tanh(mb_2)/(mbR_0))$$
 (5.12)

Similarly for $R_0 \le 1$

 $\eta_{overall} = (R_{\theta}(tanh(mb_1))/(mb)) + (tanh(mb_2)/(mb))$ (5.13)

These equations are seen to be equal for the case where R_{ϕ} = 1. A graphical representation of the relationship between the individual fin efficiencies and the practical overall efficiency is presented in Figure 9.

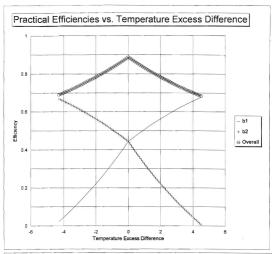


Figure 9 : Relationship of practical efficiencies with variations in base temperature excess difference

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VI. RESULTS

An accurate design and performance analysis of the HPX requires critical assessment of the thermal analyzer output data, and representation of that data in a format that is easily understood and interpreted.

A. PROGRAM OUTPUT

The thermal analyzer output data for the simplified model provides baseline temperature excess variations along the surface of the copper tubing and liquid centerline temperatures. The temperature output, for the nodes assigned to the tubing surface (1-144), indicated variations in temperature along the length of the tubing. This is due to variations in available heat transfer area, based on the assignment of node locations and resultant fin allocation. Additionally, the liquid centerline temperature showed a gradually increasing trend from inlet to outlet which is consistent with the expected results.

Analysis of the complex model resulted in similar temperature variations for both the tubing and liquid centerline temperatures, with only slight differences in actual temperature values from those obtained using the simplified model. Complex model analysis for different flow rates indicated that temperature values along the surface of the tube, and throughout the liquid in the tube were largely

dependent on the mass flow rate. For an increasing mass flow rate, this dependence resulted in lower tube surface temperatures, fluid outlet temperature, and overall change in fluid temperature as it passed through the heat exchanger. A summary of the output nodal temperatures for each model considered is found in Appendix E. The results were consistent with expectations and are presented graphically in Figures (10) and (11). In addition, the thermal analysis provided the necessary data to calculate the overall heat transfer for each mass flow rate, using;

$$q = (dm/dt) c_r \Delta T \qquad (6.1)$$

where c_r is the specific heat capacity of water (4.182 kJ/kg-K). The heat transfer rate is plotted for each mass flow rate and is presented in Figure (12).

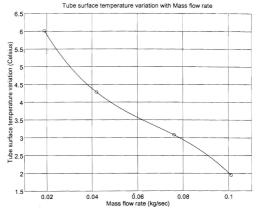


Figure 10: Graphical representation of Tube surface temperature variation with mass flow rate.

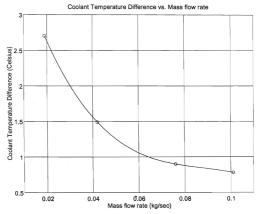


Figure 11: Graphical representation of Coolant Temperature difference $(T_{\text{outlet}}-T_{\text{inlet}})$ variation with mass flow rate.

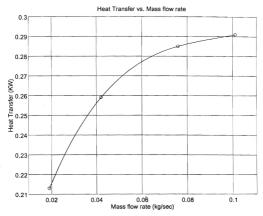


Figure 12: Graphical representation of Heat Transfer with mass flow rate.

VII. SUMMARY AND CONCLUSIONS

The results of this investigation into the thermal performance of the HPX leads to several conclusions. These conclusions are broken down into the following topics: design effectiveness, effectiveness of applying single stack cold plate analysis, effectiveness of computer modeling, and performance analysis validity.

A. DESIGN EFFECTIVENESS

Design effectiveness consideration was based solely on the physical configuration of the HFX. The use of copper tubing bent into a serpentine pattern and then soldered or furnace brazed on a screen of copper fins results in a small and inefficient contact surface between the tubing and the fins. A better design and the one actually used to model the HFX would inlay the copper tubing into the screen of copper fins. This would result in a much higher effective surface area for heat transfer than the current configuration. The success of applying a serpentine tubing pattern for this application as opposed to the more conventional parallel pattern was not analyzed and provides a basis for future thesis work.

B. EFFECTIVENESS OF SINGLE STACK COLD PLATE ANALYSIS

An analysis based on the work of Pieper and Kraus (1995) indicated distinct fin sharing characteristics along the length of copper tubing based on the temperature excess ratio across each shared fin. This resulted in small variations in computed temperatures along the length of the tubing compared to a model subjected to equal operating temperatures on the right and left base surfaces. The magnitude of this variation is dependent on the scale of the application and could result in large values for a large scale application similar to the WyoDak facility in Gillette, Wyoming. Thus, a single stack cold plate analysis would be very useful if the analysis required very accurate representations of temperature along the length of copper tubing in a large scale application. The variation in the magnitude of the temperature variation based on the scale of the application provides a basis for further research.

C. EFFECTIVENESS OF COMPUTER MODELING

Computer modeling provided a convenient and reliable method of calculating the multiple equations created as the result of a detailed analysis of the HPX heat exchanger. The use of computer modeling provides flexibility in the analysis of various heat transfer parameters. The model used for the analysis of the HPX consisted of air flowing over fins, heating water flowing through the copper tubing. Once these initial inputs are set up and the requisite files built within the thermal analysis software, it becomes simply a matter of replacing the initial model values with new values to evaluate a new system. Therefore, various working fluids with widely varying properties and different internal heat exchanger geometries can be analyzed very easily. This permits the convenient application of specific conditions for a given application, thus saving money and laborious hours in the lab building and evaluating various configurations for a given application. However, once a given application is chosen through the use of computer modeling, extensive testing and empirical data collection is required to validate the computer generated results. For the HPX model analyzed in this thesis. the collection of empirical results through testing and subsequent comparison with the computer generated results is still required.

D. VALIDITY OF PERFORMANCE ANALYSIS

The performance analysis of the HPX required the determination of the convection coefficient, h, and the conductance matrix. These values were determined using numerical analysis techniques.

In the absence of strict correlations for oscillatory flow convection coefficients, a steady flow Nusselt correlation was assumed to provide a suitable representation

of heat transfer in the channel. This is a major assumption, but not without merit based on the argument provided in the thermal performance section. However, a more representative analysis could be made through the application of a Nusselt correlation based solely on acoustically oscillated flow analysis. The derivation of these correlations is currently being pursued through a variety of research, including work conducted at Naval Postgraduate School.

The conductance matrix was used to determine the temperature distribution along the length of the copper tubing. This distribution of temperatures was reasonable and behaved predictably with changes in the mass flow rate of water through the tubing. These temperatures were then used to calculate values for the temperature excess ratio, and subsequently determine the respective lengths of b; and b;. A new temperature distribution was then found based on this cold plate analysis. This provided an adequate representation of the temperature variation along the length of the tubing, however a more accurate distribution could be acquired by repetition of the analysis for each new set of temperature distribution data acquired. This could continue until a user-specified variation limit between successive attempts was met, thus satisfying a predetermined level of accuracy.

APPENDIX A. MURRAY-GARDNER ASSUMPTIONS

The Murray-Gardner assumptions are:

- The heat flow in the fin and its temperatures remain constant with time.
- The fin material is homogenous, its thermal conductivity is the same in all directions, and it remains constant.
- The heat transfer coefficient to the fin is constant and uniform over the entire surface of the fin.
- The temperature of the medium surrounding the fin is uniform.
- The fin thickness is so small compared with its height that temperature gradients across the fin thickness may be neglected.
- 6. The temperature at the base of the fin is uniform.
- There is no contact resistance where the base of the fin joins the prime surface.
- 8. There are no heat sources within the fin itself.
- The heat transferred through the outermost edge of the fin is negligible compared with that leaving the fin through its lateral surface.
- 10. Heat transfer to or from the fin is proportional to the temperature excess between the fin and the surrounding medium.

APPENDIX B. TRANSFORMATION MATRIX DEVELOPMENT

A general application of linear, homogenous, second-order differential equation theory dictates that Equation (2.7) posses two independent solutions. These solutions, and the subsequent development of a linear transformation matrix to map conditions at the fin tip to conditions at the fin base were performed by Kraus et al. (1978). The solutions, designated $\lambda_1(\mathbf{x})$ and $\lambda_2(\mathbf{x})$, must satisfy the initial conditions at the base of the fin where $\mathbf{x} = \mathbf{b}$.

$$\lambda_1(b) = 1; \lambda_1'(b) = 0,$$
 $\lambda_2(b) = 0; \lambda_2'(b) = (1/kA_c(b))$
(B.1)

where the prime indicates a first derivative. The heat flow, $q(x) \;,\; \text{is always taken as positive from base to tip.}$ Therefore, for longitudinal fins, q(x) is given by;

$$q(x) = kA_c(x) (d\theta(x)/dx)$$
 (B.2)

Thus, the solutions λ_1 and λ_2 can be used to assemble the expressions for the temperature excess $\theta(x)$ and heat flow q(x), at any point in the fin in terms of θ_b and q_b at the fin base;

$$\theta(x) = \theta_0 \lambda_1(x) + q_0 \lambda_2(x)$$
 (B.3)

$$q(x) = kA_c(x) [\theta_b \lambda_1'(x) + q_b \lambda_2'(x)]$$
 (B.4)

In matrix form, Equations (B.3) and (B.4) become:

$$\begin{bmatrix} \theta \begin{pmatrix} x \\ q \end{pmatrix} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & k A_c(x) \end{bmatrix} \begin{bmatrix} \lambda_1(x) & \lambda_2(x) \\ \lambda_1^{'}(x) & \lambda_2^{'}(x) \end{bmatrix} \begin{bmatrix} \theta_b \\ q_b \end{bmatrix} \tag{B.5}$$

The thermal transmission matrix is the linear transformation generated when x is set equal to a, where a equals either the fin height or zero depending on the origin of the height coordinate:

$$\begin{bmatrix} \theta_a \\ q_a \end{bmatrix} = \Gamma \begin{bmatrix} \theta_b \\ q_b \end{bmatrix} = \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} \theta_b \\ q_b \end{bmatrix}$$
(B.6)

where

$$\begin{aligned} \gamma_{11} &= \lambda_1(\mathbf{a}) \\ \gamma_{12} &= \lambda_2(\mathbf{a})^* \\ \gamma_{21} &= k\lambda_2(\mathbf{a})\lambda_1^{-1}(\mathbf{a}) \\ \gamma_{22} &= k\lambda_2(\mathbf{a})\lambda_1^{-1}(\mathbf{a}) \end{aligned}$$

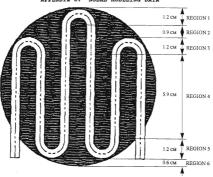
$$(\mathbf{B}.7)$$

The elements of the thermal transmission matrix are called the thermal transmission parameters. To represent conditions at the fin base in terms of conditions at the fin tip, it is seen that:

$$\begin{bmatrix} \theta_b \\ q_b \end{bmatrix} = \Gamma^{-1} \begin{bmatrix} \theta_a \\ q_a \end{bmatrix} = \beta \begin{bmatrix} \theta_a \\ q_a \end{bmatrix} = \begin{bmatrix} \tau_{11} & \tau_{12} \\ \tau_{21} & \tau_{22} \end{bmatrix} \begin{bmatrix} \theta_a \\ q_a \end{bmatrix}$$
 (B.8)

where the matrix β is the inverse of the thermal transmission matrix and is called the inverse thermal transmission matrix. Its elements are designated as the inverse thermal transmission parameters.

APPENDIX C. NODAL MODELING DATA



REGION	LENGTH (CM)	# OF FINS	# OF NODES	FINS/NODE
1	1.2	22.6	3	7.53
2 -	0.9	16.2	2	8.1
3	1.2	22.6	3	7.53
4	5.9	110.7	16	6.92
5	1.2	22.6	3	7.53
- 6	0.6	11.3	0	N/A

	Tube Surface Nodes	Liquid Nodes
	21 - 23	165 - 167
	5 - 20	149 - 164
	1 - 4	145 - 148
(a	24 - 26	168 - 170
	27 - 42 :	171 - 186
	43 - 45	187 - 189

	Tube Surface Nodes	Liquid Nodes
	70 - 72	214 - 216
	68 - 69	212 - 213
	65 - 67	209 - 211
	49 - 64	193 - 208
	46 - 48	190 - 192
_		
	73 - 75	217 - 219
	76 - 77	220 - 221
	78 - 80	222 - 220
	81 - 96 <u>.</u>	223 - 238
	97 - 99	239 - 242
	67	

	Tube Surface Nodes	Liquid Nodes
	119 -121	263 - 265
	103 - 118	247 - 262
	100 - 102	244 - 246
Ca	122 - 124	266 - 268
	125 - 140	269 - 284
	141 - 144	284 - 288

APPENDIX D. SPREADSHEET K-VALUE DETERMINATION AND NODE CONNECTION DATA

The general procedure for each case is as follows:

- 1. Use node location and applicable equations to determine fin length associated with that particular node.
- 2. Determine K-Values using spreadsheet application.
- Input K-Values into user friendly spreadsheet that associates each K-Value with a particular node and branch.
- Once K-Values are input into thermal analysis software, an easily read summary of the individual branches and their associated conductances is produced.

(1) Case Title: TALSR(METRIC)---- RUN 1. SIMPLE MODEL CASE (2) Nodes 288 (3) Constant Temperatures 2 (4) Unique Exponents 0 (5) Temperature Dependent Conductances 0 (6) Temperature Dependent Heat Inputs 0 (7) Computational Accuracy .0100 (8) Starting Temperature 25.0

Are these inputs correct (Y/N) ? Y

TASS GENERAL INPUT MENU - SI Units

CONDUCTIVITY	EFFECTIVE FIN LENGTH (L) IN CENTIMETERS
K1	N/A
K2	N/A
K3	N/A
K4	N/A
K5	N/A
K6	0.5715
K7	0.094
K8	0.269
K9	0.414
K10	0.531
K11	0.62
K12	0.681
K13	0.716
K14	0.732
K15	N/A
K16	N/A
K17	N/A
K18	0.552
K19	0.404
K20	0.148
K21	1.0185
K22	0.748
K23	0.592
K24	0.888
K25	0.55
K26	1.4655
K27	0.925
K28	0.6125
K29	N/A
K30	N/A
K31	N/A
K32	0.5715
K33	N/A
K34	N/A
K35	N/A
K36	N/A
K37	N/A
K38	N/A
K39	0.5715
K40	2.907
K41	N/A
K42	2.482
K43	1.84
K44	1.119
K45	0.359
K46	N/A

2	Pipe Anna (sq. cm.) 0.134																												
TALSEM	_	X - Value	(Work)	1.778	0.576	1.461	0.701	0.084	0.049	0.068	0.062	0.001	0.100	0.101	1291	7,192	0000	0.071	0.032	0.131	0.004	0.124	0.092	0.149	0.125	0.097	1,082	0.000	0.000
	Outer plps diameter frner plps diameter (cm) (cm) 0.635 0.483	Firehods		NWA	V.V	N. A.	NA	0.880	0.880	6.880	0.880	0.880	0.000	6.880	NA	× × ×	7.540	7.540	2.540	7.540	7 540	7.540	7.540	7.540	7.540	7.540	¥:	× *2	7.540
	Prandti Number 0	Dist behasen hodes	(cm)	0.302	0.302	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.416	0.465	0.465	0.465	0.465	0.465	0.466	0.465	0.465	0.465	0.465	0.465	0.496	0.548	0.541
	(Raynolds Number 1900.00	ja,	(WIK)	,				0.01169	0.00658	0.00937	0.01136	0.01271	0.01354	0.01419			0.01138	0.00685	0.00366	0.01683	001300	0.01591	0.01167	0.01924	0.01602	0.01230			0.01169
	Thermal Conductivity of Copper (KRaynolds Namber (Win-K) 491.00 1900.00	Heal Transfer Coefficent (h)	(Whepan-K)	NA	1260	5 <u>5</u>	1 260	97900	0.03607	0.03813	0.03749	0.03716	0.03698	0.03686	ž:	AN .	0.00629	0.00670	0.03928	0.03578	0.03633	0.03857	0.03741	0.03560	0.03584	0.03618	¥2	1.260	909000
	Fin spacing (z) (cm) 0.053	Effective Diameter	(uzı)					0.10192	0.08904	0.00450	0.09694	0.00823	0.09893	0.09943			0.10176	0.10008	0.09038	0.10396	0.10300	0.10064	0.09725	0.10477	0.10369	0.10223			0.10192
1	Fin Thickness (cm) 0.015	Channel Width (b) Effective Diameter	(cm)					1.143	0.269	0.414	0.531	0.620	0.716	0.732			1.104	0.808	0.296	2007	707	0.888	0.550	2.931	1850	1.225			1 143
CALL DAY	Fin Length (L) (cm) 0.318	ş		ž	2 5	2 2	9	2 5	2 2	92	X10	¥ 5	K13	¥.	K15	2 2	81X	8 X	K20	2 5	2 5	ž	23	K26	K27	23	8	2 5	K32

NAA 2.100 NAA 0.450 NAA 0.656 NAA 0.666 NAA 0.120 NAA 1.200 NAA 1.

0.2384 0.2384 0.423 0.443 0.447 0.465 0.465

> 0.02086 0.02087 0.02025 0.01775 Q 00634

NA 1.260 NA 1.260 0.03628 0.03528 0.03567 0.03567 0.03567 0.03567 0.03567 0.03568 0.03

0.10476 0.10444 0.10368 0.10182 0.096288

2,462 2,462 1,840 1,119 0,359

BRANCH	NODE	TON	TAG	I, C, S	BRANCH	NODE	TON	TAG	1, C, S
1	1	2	1	K1	51	16	17	1	S9
2		145	4	K2	52		160	4	S10
3	2	3	1	S1	53		301	- 1	S11
4		146	4	S2	54		301	1	S38
5	3	4	1	S1	55	17	18	1	S9
6		147	4	S2	56		161	4	S10
7	4	5	1	K3	57		301	1	S11
8		148	4	S2	58		301	1	S34
9	5	- 6	1	K4	59	18	19	1	S9
10		149	4	K5	60		162	4	S10
11		301	1	K6	61		301	1	S11
12	6	7	1	S9	62		301	1	S30
13		150	4	S10	63	19	20	1	S9
14		301	1	S11	64		163	4	S10
15	7	8	1	S9	65		301	1	S11
16		151	4	S10	66		301	1	S26
17		301	1	S11	67	20	21	1	K15
18	_	301	1	K7	68		164	4	S10
19	8	9	1	S9	69		301	1	S11
20	-	152	4	S10	70		301	1	S22
21	_	301	1	S11	71	21	22	1	K16
22	-	301	1	K8	72	41	165	41	K17
23	9	10	1	S9	73	_	301	1	K18
24	- 3	153	4	S10	74	22	23	1	S71
25	_	301	1	S11	75	- 22	166	4	S72
26	_	301	1	K9	76	_	301	1	K19
27	10	11	1	S9	77	23	24	1	S71
28	10	154	4	S10	78	23	167	4	572
29	_	301	1	S10	79		301	1	K20
30		301	1	K10	80	24	25	1	S71
31	11	12	1	S9	81	24	168	4	S72
	11	155	4			_			K21
32	-			S10	82		301	1	S79
		301	1	S11	83		301		
34		301	1	K11	84	25	26	1	S71
35	12	13	1	S9	85		169	4	S72
36		156	4	S10	86	_	301	1	K22
37		301	1	S11	87		301	1	S76
38		301	1	K12	88	26	27	1	S67
39	13	14	1	S9	89	_	170	4	S72
40		157	4	S10	90		301	1	K23
41		301	1	S11	91		301	1	S73
42	L	301	1	K13	92	27	28	1	S9
43	14	15	1	S9	93		171	4	S10
44		158	4	S10	94		301	1	S11
45		301	1	S11	95		301	1	S11
46		301	1	K14	96	28	29	1	S9
47	15	16	1	S9	97		172	4	S10
48		159	4	S10	98		301	1	S11
49		301	1	S11	99		301	1	S11
50		301	1	S42	100	29	30	1	S9

BRANCH	NODE	TON	TAG	I, C, S	BRANCH	NODE	TON	TAG	1, C. S
101		173	4	S10	151		301	1	S11
102		301	1	S11	152	42	43	1	S67
103		301	1	S11	153		186	4	S10
104	30	31	1	S9	154		301	1	S11
105		174	4	S10	155		301	1	S11
106		301	1	S11	156	43	44	1	S71
107		301	1	S11	157		187	4	\$72
108	31	32	1	S9	158		301	1	573
109		175	4	S10	159		301	1	K24
110		301	1	S11	160	44	45	1	S71
111		301	1	\$11	161		188	4	S72
112	32	33	1	S9	162		301	1	S76
113		176	4	S10	163		301	1	K25
114	1	301	1	S11	164	45	46	1	S71
115	-	301	1	S11	165		189	4	S72
116	33	34	1	S9	166		301	1	S79
117		177	4	S10	167	46	47	1	S71
118		301	1	S11	168		190	4	S72
119	_	301	1	S11	169		301	1	K26
120	34	35	1	S9	170		301	1	S79
121	- 0 -	178	4	S10	171	47	48	1.	S71
122	_	301	1	S11	172		191	4	572
123		301	1	S11	173		301	1	K27
124	35	36	1	\$9	174		301	1	S76
125	- 33	179	4	S10	175	48	49	1	S67
126		301	1	S11	176	40	192	4	572
127		301	1	S11	177		301	1	K28
128	36	37	1	S9	178		301	1	S73
129	30	180	4	S10	179	49	50	1	S9
130		301	1	S10 S11	180	49	193	4	S10
			1	S11	181				
131	0.7	301		S9	182		301 301	1	S11
	37	38	1 4					1	S11
133		181	1	S10 S11	183 184	50	51 194	1 4	S9
134		301	1	S11 S11			301	1	S10
		301	1		185				S11
136	38	39		S9	186		301	1	S11
137		182	4	S10	187	51	52	4	S9
138		301	1	S11	188		195		\$10
139	26	301	1	S11	189		301	1	S11
140	39	40	1	S9	190		301	1	S11
141		183	4	S10	191	52	53	1	S9
142		301	1	S11	192		196	4	S10
143		301	1	S11	193		301	1	S11
144	40	41	1	S9	194		301	1	S11
145		184	4	S10	195	53	54	1	S9
146		301	1	\$11	196		197	4	S10
147		301	1	S11	197		301	1	S11
148	41	42	1	S9	198		301	1	S11
149		185	4	S10	199	54	55	1	S9
150		301	1	S11	200	L	198	4	S10

BRANCH	NODE	TON	TAG	I. C. S	BRANCH		TON	TAG	I. C. S
201		301	1	S11	251	67	68	1	K35
202		301	1	\$11	252		211	4	K36
203	55	56	1	S9	253		301	1	S245
204		199	4	S10	254		301	1	S82
205		301	1	S11	255	68	69	1	K37
206		301	1	S11	256		212	4	K38
207	56	57	1	S9	257		301	1	K39
208		200	4	S10	258		301	1	K40
209		301	1	S11	259	69	70	1	K41
210		301	1	S11	260		213	4	S256
211	57	58	1	S9	261		301	1	S257
212	- 01	201	4	S10	262		301	1	K42
213	_	301	1	S11	263	70	71	1	S71
214	-	301	1	S11	264	10	214	4	S72
_15	58	59	1	S9	265		301	1	S73
216	- 70	202	4	S10	266		301	1	K43
217	_	301	1	S10 S11	267	71	72	1	S71
218	_		1			7.1		4	
218	59	301	1	S11	268		215	1	S72
	59	60	4	S9	269		301		S76
220		203		S10	270		301	1	K44
221		301	1	S11	271	72	73	1	S71
222		301	1	S11	272		216	4	S72
223	60	61	1	S9	273		301	1	S79
224		204	4	S10	274		301	1	K45
225		301	1	S11	275	73	74	1	S71
226		301	1	S11	276		217	4	S72
227	61	62	1	S9	277		301	1	S274
228		205	4	S10	278		301	1	S79
229		301	1	S11	279	74	75	1	S71
230		301	1	S11	280		218	4	S72
231	62	63	1	S9	281		301	1	S270
232		206	4	S10	282		301	1	S76
233		301	1	S11	283	75	76	1	S259
234		301	1	S11	284		219	4	S72
235	63	64	1	S9	285		301	1	S266
236	1,4	207	4	S10	286		301	1	S73
237		301	1	S11	287	76	77	1	S255
238	1	301	1	S11	288		220	4	S256
239	64	65	1	K29	289		301	1	S262
240	-	208	4	S10	290		301	1	S257
241	_	301	1	S11	291	77	78	1	S251
242	_	301	1	S11	292		221	4	S256
243	65	66	1	K30	293	-	301	1	S258
244	- 33	209	4	K31	294		301	1	S257
245	-	301	1	K32	295	78	79	1	S247
245	_	301	1	S90	296	10	222	4	S252
247	- 00	67			290	-	301	1	S82
247	66		. 1	K33	297	+	301	1	S245
	-	210	4	K34		70	80	1 1	S245
249		301	1	S245	299	79	223	1 4	S243 S248
250		301	. 1	S86	300		Z23	4	5248

BRANCH	NODE	TON	TAG	I. C. S	BRANCH	NODE	TON	TAG	I. C. S
301		301	-1	S86	352		236	4	\$10
302		301	1	S245	353		301	1	S11
303	80	81	1	S239	354		301	1	S11
304		224	4	S244	355	93	94	1	S9
305		301	1	S90	356		237	4	S10
306		301	1	S245	357		301	1	S11
307	81	82	1	59	358		301	1	S11
308		225	4	S10	359	94	95	1	S9
309		301	1	S11	360	-	238	4	S10
310		301	1	S11	361		301	1	S11
311	82	83	1	S9	362		301	1	S11
312		226	4	S10	363	95	96	1	39
313		301	1	S11	364	- 00	239	4	S10
314		301	1	S11	365		301	1	S11
315	83	84	1	S9	366		301	1	S11
316		227	4	S10	367	96	97	1	S67
317		301	1	S11	368	50	240	4	S10
318		301	1	S11	369		301	1	S11
319	84	85	1	S9	370	_	301	1	S11
320	04	228	4	S10	371	97	98	1	S71
321		301	1	S11	372	31	241	4	572
322	_	301	1	S11	373	_	301	1 -	S73
323	85	86	1	S9	374	_	301	1 1	S177
324	00	229	4	S10	375	98	99	1	S71
325		301	1	S11	376	30	242	4/	S72
325			1	S11	377	_	301	1	
327		301 87	1	S9	378	_	301		S76
	86					- 00		1	S173
328		230	4	S10	379	99	100	1	S71
329		301	1	S11	380		243	4	\$72
330		301	1	\$11	381		301	1	S79
331	87	88	1	S9	382		301	1	S169
332		231	4	S10	383	100	101	1	\$71
333		301	1	S11	384		244	4	S72
334		301	1	S11	385		301	1	\$79
335	88	89	1	S9	386	101	102	1	\$71
336		232	4	S10	387	_	245	4	S72
337		301	1	S11	388		301	1	S163
338		301	1	S11	389		301	1	S76
339	89	90	1	S9	390	102	103	1	S67
340		233	4	S10	391		246	4	S72
341		301	1	S11	392		301	1	S159
342		301	1	S11	393		301	1	S73
343	90	91	1	S9	394	103	104	1	S9
344		234	4	S10	395		247	4	\$10
345		301	1	S11	396		301	1	S11
346		301	1	S11	397		301	1	S11
347	91	92	1	S9	398	104	105	1	S9
348		235	4	S10	399		248	4	S10
349		301	1	S11	400		301	1	S11
350		301	1	S11	401		301	1	S11
351	92	93	1	S9	402	105	106	1	S9

BRANCH	NODE	TON	TAG	I. C. S	BRANCH	NODE	TON	TAG	I. C. S
403		249	4	S10	453		301	1	S11
404		301	1	S11	454	118	119	1 1	S67
405		301	1	S11	455		262	4	S10
406	106	107	1	S9	456		301	1	S11
407		250	4	S10	457		301	1	\$11
408		301	1	S11	458	119	120	1	S71
409		301	1	S11	459		263	4	S72
410	107	108	1	S9	460		301	1	S73
411		251	4	S10	461		301	1	S90
412		301	1	S11	462	120	121	1	S71
413		301	1	S11	463		264	4	S72
414	108	109	1	S9	464		301	1	S76
415		252	4	S10	465		301	1	S86
416	1	301	1	S11	466	121	122	1	S71
417	1	301	1	S11	467		265	4	S72
418	109	110	1	S9	468		301	1	S79
419		253	4	S10	469		301	1 1	S82
420		301	1	S11	470	122	123	1	S71
421		301	1	S11	471		266	4	S72
422	110	111	1	S9	472		301	1	S79
423		254	4	S10	473	123	124	1	S71
424	-	301	1	S11	474	-	267	4 "	S72
425	_	301	1	S11	475	_	301	1	S76
426	111	112	1	S9	476	124	125	3	S67
427		255	4	S10	477		268	4	S72
428	_	301	1	S11	478		301	1	S73
429	_	301	1	S11	479	125	126	1	S9
430	112	113	1	S9	480	140	269	4	S10
431		256	4	S10	481		301	1	S22
432	-	301	1	S11	482	_	301	1	S11
433	-	301	1	S11	483	126	127	1	S9
434	113	114	1	S9	484	120	270	4	S10
435	113	257	4	S10	485	_	301	1	S26
436	_	301	1	S11	486		301	1	S11
437	_	301	1	S11	487	127	128	1	S9
438	114	115	1	S9	488	127	271	4	S10
439	117	258	4	S10	489	_	301	1	S30
440	-	301	1	S11	490		301	1	S11
441	_	301	1	S11	491	128	129	1	S9
442	115	116	1	S9	492	.20	272	4	\$10
443	.13	259	4	S10	493		301	1	S34
444	-	301	1	S11	494	-	301	1	S11
445	-	301	1	S11	495	129	130	1	59
446	116	117	1	S9	496	123	273	4	S10
447	110	260	4	S10	497	_	301	1	S38
448	-	301	1	S11	498	+	301	1	S11
448	-		1	S11	490	130	131	11	S9
450	117	301	1	S11 S9	500	130	274	4	S10
451	117			S10	500	-	301	1 1	S42
451		261	4	510	501		301	- 1	S11

BRANCH	NOSE	TON	TAG	I, C, S	BRANCH	NODE	TON	TAG	1. C. S
503	131	132	1	S9	553				1, 0, 0
504		275	4	S10	554				
505		301	1	S46	555				
506		301	1	S11	556				
507	132	133	1	S9	557	_			
508		276	4	S10	558				
509		301	1	S42	559			_	
510		301	1	S11	560	_	_		
511	133	134	1	S9	561		_		
512		277	4	S10	562				
513	_	301	1	S38	563	_	_	_	
514		301	1	S11	564		_		
515	134	135	1	S9	565				
516	134	278	4	S10	566		_	_	
517	\rightarrow	301	1	S34	567	_	-	_	
518		301	1	S11	568		-	_	
519	135	136	1	S9	569		-		
520	130	279	4	S10	570		_		
521	_	301	1	\$30	571				
522	_		1			_	-		
522	136	301 137	1	S11 S9	572 573		_		
	136						_		
524	· ·	280	4	S10	574				
525		301	1	S26	575	_			
526		301	1	S11	576		_	-	
527	137	138	1	S9	577		_		
528		281	4	S10	578				
529		301	1	S22	579				
530		301	1	S11	580				
531	138	139	1	S9	581				
532		282	4	S10	582				
533		301	1	S18	583				
534		301	1	S11	584				
535	139	140	1	S9	585				
536		283	4	S10	586				
537		301	1	S11	587				
538	140	141	1	S7	588				
539		284	4	S10	589				
540		301	1	S11	590				
541	141	142	1	S1	591				
542		285	4	S2	592				
543	142	143	1	S1	593				
544		286	4	S2	594				
545	143	144	1	S1	595				
546		287	4	52	596				_
547	144	288	4	S2	597				
548		-200	_		598				
549				_	599		_		
550				_	600				
		_	-		601			_	
551									

BRANCH	NODE	TON	TAG	I, C, S	BRANCH	NODE	TON	TAG	1. C. S.
701	145	302	5	K46	751	195	194	5	S701
702	146	145	5	S701	752	196	195	5	S701
703	147	146	5	S701	753	197	196	5	S701
704	148	147	5	S701	754	198	197	5	S701
705	149	148	5	S701	755	199	198	5	S701
706	150	149	- 5	S701	756	200	199	5	S701
707	151	150	5	S701	757	201	200	5	\$701
708	152	151	5	S701	758	202	201	5	S701
709	153	152	5	S701	759	203	202	5	S701
710	154	153	5	S701	760	204	203	5	S701
711	155	154	5	S701	761	205	204	5	S701
712	156	155	5	S701	762	206	205	5	S701
713	157	156	5	S701	763	207	206	5	S701
714	158	157	- 5	S701	764	208	207	5	\$701
715	159	158	5	S701	765	209	208	5	S701
716	160	159	5	S701	766	210	209	5	S701
717	161	160	5	S701	767	211	210	5	S701
718	162	161	5	S701	768	212	211	5	S701
719	163	162	5	S701	769	213	212	5	S701
720	164	163	5	S701	770	214	213	5	S701
721	165	164		S701	771	215	214	5	S701
722	166	165	5	S701	772	216	215	5	S701
723	167	166	5 5 5	S701	773	217	216	5	S701
724	168	167	5	S701	774	218	217	5	S701
725	169	168	5	S701	775	219	218	× 5	S701
726	170	169	5	S701	776	220	219	5	S701
727	171	170	5	S701	777	221	220	5	S701
728	172	171	5	S701	778	222	221	5	S701
729	173	172	5	S701	779	223	222	5	S701
730	173	173	5	S701	780	223	222	5	S701
731	175	174	5	S701	781	225	223	5	S701
732						226	225	5	S701
732	176	175	5	S701	782			5	5701
733	177	176	5	S701	783	227	226	5	S701
734	178	177	5	S701	784	228	227	5	S701
735	179	178	5	S701	785	229	228	5	S701
736	180	179	5	S701	786	230	229	5	S701
737	181	180	5	S701	787	231	230	5	S701
738	182	181	5	S701	788	232	231	5	S701
739	183	182	5	S701	789	233	232	5	S701
740	184	183		S701	790	234	233	5	S701
741	185	184	5	S701	791	235	234	5	S701
742	186	185	5	S701	792	236	235	5	S701
743	187	186	5	S701	793	237	236	5	S701
744	188	187	5	S701	794	238	237	5	S701
745	189	188	5	S701	795	239	238	5	S701
746	190	189	5	S701	796	240	239	5	S701
747	191	190	5	S701	797	241	240	5	S701
748	192	191	5	S701	798	242	241	5	S701
749	193	192	5	S701	799	243	242	5	S701
750	194	193	5	S701	800	244	243	5	S701

BRANCH		TON	TAG	1, C, S	BRANCH	NODE	TON	TAG	I. C. S.
801	245	244	5	S701	851		-		1, 0, 0,
802	246	245	5	S701	852		_		_
803	247	246	5	S701	853		_		
804	248	247	5	S701	854				-
805	249	248	5	S701	855	_	_	_	
806	250	249	5	S701	856			_	
807	251	250	5	S701	857				
808	252	251	5	S701	858			_	
809	253	252	5	S701	859		_	-	
810	254	253	5	S701	860		_	_	
811	255	254	5	S701	861		_	_	
812	256	255	5	S701	862	_	_	_	
813	257	256	5	S701	863	_		_	
814	258	257	5	S701	864	_	-		
815	259	258	5	S701	865		_	_	
816	260	259	5	S701	866	_	_		
817	261	260	5	S701	867			_	
818	262	261	5	S701	868			_	
819	263	262	5	S701	869		_		
820	264	263	5	S701	870		_		
			5				_		
821 822	265	264	5	S701 S701	871				
822	266	265	5		872				
	267	266		S701	873				
824	268	267	5	S701	874				
825	269	268	5	\$701	875			/	
826	270	269	5	S701	876				
827	271	270	5	S701	877				
828	272	271	5	S701	878				
829	273	272	5	S701	879				
830	274	273	5	S701	880				
831	275	274	5	S701	881				
832	276	275	5	S701	882				
833	277	276	5	S701	883				
834	278	277	5	S701	884				
835	279	278	- 5	S701	885				
836	280	279	5	S701	886				
837	281	280	5	S701	887				
838	282	281	5	S701	888				
839	283	282	5	S701	889				
840	284	283	5	S701	890				
841	285	284	- 5	S701	891	_			
842	286	285	- 5	S701	892				
843	287	286	5	S701	893				
844	288	287	5	S701	894				
845		-			895				
846					896	_			
847					897		_		
		-		_	898				
848									
848 849			_	_	899		_		

TA	SS Branc	ch C	onnection	Summat	y	in	W/de	egC	or	Watts	i	f Tag	- 3	.0
Dunh	Pun- m		q Conduct	B	n			_						
1	1 2		.178E+01	57		om To 301								Conduct
2	1 145	4	.576E+00	58	17			.8401		113		176 301	4	.701E+00
3	2 3	1	.178E+01	59	18	19		.1461		114	32	301	1	.840E-01
4	2 146	4	.576E+00	60	18			.701E		116	33	301		.840E-01
5	3 4	i	.178E+01	61	18	301		.840E		117		177	1	.146E+01
6	3 147	4	.576E+00	62	18	301		.820E		118		301	1	
7	4 5	i	.160E+01	63	19	20		.146E		119	33	301	1	.840E-01
8	4 148	4	.576E+00	64		163		.701E		120	34	35	î	.146E+01
9	5 6	1	.146E+01	65	19	301		.840E		121		178	4	.701E+00
10	5 149	4	.701E+00	66	19	301		.680E		122		301	i	.840E-01
11	5 301	1	.840E-01	67	20	21		.129E		123	34	301	ī	.840E-01
12	6 7	1	.146E+01	68	20	164		.701E		124	35	36	î	.146E+01
13	6 150	4	.701E+00	69	20	301	1	.840E	-01	125		179	4	.701E+00
14	6 301	1	.840E-01	70	20	301	1	.490E	-01	126	35	301	1	.840E-01
15	7 8	1	.146E+01	71	21	22	1	.115E	+01	127	35	301		.840E-01
16	7 151	- 4	.701E+00	72	21	165	4	.889E	00+3	128	36	37	1	.146E+01
17	7 301	1	.840E-01	73	21	301	1	.900E	-01	129	36	180	4	.701E+00
18	7 301	1	.240E-01	74	22	23		.115E		130	36	301	1	.840E-01
19	8 9	1	.146E+01	75	22	166		.889E		131	36	301	1	.840E-01
20	8 152	4	.701E+00	76	22	301		.710E		132	37	38	1	.146E+01
21	8 301	1	.840E-01	77	23	24		.115E		133	37	181	4	.701E+00
22	8 301	1	.490E-01	78	23	167		.889E		134	37	301	1	.840E-01
23	9 10	1	.146E+01	79	23	301		.320E		135	37	301	1	.840E-01
24	9 153	4	.701E+00	80	24	25		-115E		136	38	39	1	.146E+01
25 26	9 301	1	.840E-01	81	24			.889E		137	38	182	4	.701E+00
27	10 11	1	.680E-01	82	24	301		.131E		138	38	301	1	.840E-01
28	10 154	4	.146E+01	83	24	301		.320E		139	38	301	1	.840E-01
29	10 154	1	.701E+00 .840E-01	84 85	25	26		.115E		140	39	40	1	.146E+01
30	10 301	1	.820E-01	86	25	169 301		.889E		141		183	4	.701E+00
31	11 12	î	.146E+01	87	25	301		.111E		142	39	301	1	.840E-01
32	11 155	4	.701E+00	88	26	27		.129E		143	39 40	301	1	.840E-01
33	11 301	ī	.840E-01	89	26			.8891		145		184	1	.146E+01
34	11 301	î	.910E-01	90	26	301		.940E		146	40	301	4	.701E+00
35	12 13	î	.146E+01	91	26	301		.9001		147	40	301		.840E-01
36	12 156	4	.701E+00	92	27	28		.146E		148	41	42		.146E+01
37	12 301	1	.840E-01	93	27			.701E		149	41	185	4	.701E+00
38	12 301	ī	.970E-01	94	27	301		.840E		150	41	301		.840E-01
39	13 14	1	.146E+01	95	27	301		.840E		151	41	301		.840E-01
40	13 157	4	.701E+00	96	28	29		.146E		152	42	43		.129E+01
41	13 301	1	.840E-01	97	28			.701E		153	42	186		.701E+00
42	13 301	1	.100E+00	98	28	301	1	.840E	-01	154	42	301		.840E-01
43	14 15	1	.146E+01	99	28	301	1	.840E	-01	155	42	301		.840E-01
44	14 158	4	.701E+00	100	29	30	1	.146E	+01	156	43	44		.115E+01
45	14 301	1	.840E-01	101		173		.701E		157	43	187	4	.889E+00
46	14 301	1	.101E+00	102	29	301		.840E		158	43	301	1	.900E-01
47	15 16	1	.146E+01	103	29			.840E		159	43	301	1	.124E+00
48	15 159	4	.701E+00	104	30	31		.146E		160	44	45		.115E+01
49	15 301	1	.840E-01	105	30			.701E		161		188		.889E+00
50 51	15 301	1	.100E+00	106	30			.8401		162	44	301		.710E-01
	16 17	1	.146E+01	107	30	301		.840E		163	44	301		.920E-01
52 53	16 160	4	.701E+00	108	31	32		.1461		164	45	46		.115E+01
54	16 301 16 301	1	.840E-01	109		175		.701E		165		189		.889E+00
55	17 18	1	.970E-01	110	31	301		.840E		166	45	301		.320E-01
56	17 161	4	.146E+01 .701E+00	111	31	301		.840E		167	46	47		.115E+01
50	7, 101	•	. /UIE+UU	1112	32	. 33	1	.1461	101	168	46	190	4	.889E+00

Strip From To Tag Conduct											
1469 6 301 1 1.498F-00 225 60 301 1 .840E-01 221 74 301 1 .713E-510 1714 73 031 1 .139E-501 225 60 301 1 .840E-01 221 74 301 1 .713E-510 1717 47 301 1 .129E-00 228 61 205 4 .701E-00 224 75 219 4 .8189E-01 225 1717 47 301 1 .129E-00 228 61 205 4 .701E-00 224 75 219 4 .8189E-01 225 1717 47 301 1 .129E-00 228 61 205 4 .701E-00 224 75 219 4 .8189E-01 225 1717 48 1924 1 .129E-00 231 62 206 1 .713E-00 224 75 219 4 .8189E-01 225 1717 48 1924 1 .129E-01 231 62 206 1 .713E-00 224 75 219 4 .8189E-01 225 1718 48 1924 1 .129E-01 231 62 206 1 .713E-01 227 77 1 .700E-01 225 1718 48 1924 1 .129E-01 231 62 206 1 .713E-01 227 77 1 .700E-01 225 1718 48 1924 1 .129E-01 231 62 206 1 .146E-01 227 77 1 .700E-01 225 1718 48 1924 1 .129E-01 231 62 206 1 .146E-01 227 77 1 .129E-01 225 1718 48 1924 1 .146E-01 235 63 64 1 .466E-01 227 77 71 .120E-01 225 1718 48 1924 1 .146E-01 237 63 201 1 .466E-01 227 77 71 .120E-01 225 1718 48 1924 1 .146E-01 237 63 201 1 .466E-01 227 77 71 .120E-01 225 1718 48 1924 1 .146E-01 237 63 201 1 .466E-01 227 77 71 .120E-01 225 1718 48 1924 1 .146E-01 237 63 201 1 .466E-01 227 77 72 1 .465SE-00 225 1718 48 1924 1 .146E-01 237 63 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 48 1924 1 .146E-01 237 63 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 48 1924 1 .146E-01 237 63 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 48 1924 1 .146E-01 237 63 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 48 1924 1 .146E-01 240 64 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 48 1924 1 .146E-01 240 64 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 48 1924 1 .146E-01 240 64 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 48 1924 1 .146E-01 240 64 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 48 1924 1 .146E-01 240 64 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 49 101 1 .840E-01 240 64 201 1 .466E-01 227 77 72 1 .465SE-01 225 1718 50 201 1 .840E-01 240 64 201 1 .840E-01 227 77 201 1 .465SE-01 225 1718 50 201 1 .840E-01 240 64 201 1 .840E-01 227 77 201 1 .465SE-01 225 1718 50 201 1 .840E-01 240 64 201 1 .840E-01 227 77 201 1 .465SE-	Brnh	From To	Tag Conduct	Brnh	From To	Tag	Conduct	Brnh	From To	Tar	. Candoon
170	169	46 301	1 .149E+00					281	74 301		
171 47 48 1 1.15E-0. 27 6 1 62 1.16E-0. 28 79 76 1 1.20E-0. 28 79 76 1 1.20E-0. 28 79 76 1 1.20E-0. 28 79 19 4 1 1.20E-0. 29 61 20 1 1 1.20E-0. 29 77 70 20 1 1.20E-0. 29 61 20 1 1 1.20E-0. 29 77 70 20 1 1.20E-0. 29 79 20 1 1 1.20E-0. 29 79 20	170	46 301	1 .320E-01	226	60 301	1 .	840E-01				
171 171		47 48	1 .115E+01	227		1 .	146E+01				
171 47 301 1 125E-00 229 61 301 1 480E-01 285 79 301 1 190E-01 170 47 47 47 47 47 47 47	172	47 191	4 .889E+00	228	61 205						
17.5 17.5				229	61 301	1 .	840E-01	285			
1,756			1 .710E-01	230	61 301	1 .	840E-01	286	75 301		
17.5				231	62 63	1 .	146E+01	287	76 77		
177				232	62 206	4 .	701E+00	288	76 220		
1,14									76 301	1	
1.00				234	62 301	1 .	840E-01	290	76 301		
180 4 30 1 4 - 2018-00 238 6 3 207 4 - 7018-00 239 77 221 4 - 6558-00 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1								291	77 78	1	
1.00 1.00										4	
181 50 54 4 -7012+00 209 64 208 4 -7012+00 205 78 207 4 -7012+00 208 4 208										1	.172E+00
184 50 194 4 7012F-00 240 64 208 4 7012F-00 296 78 222 4 5.442F-00 296 8 208 1 1.1842F-01 296 78 222 4 5.442F-00 296 78 297 78 301 1 1.1812F-00 296 78 297									77 301	1	.980E-01
185 50 301 1 .840E-01 244 64 301 1 .840E-01 297 78 501 1 .131E-00 18 18 18 18 18 18 18 18 18 18 18 18 18										1	.172E+01
1.6										4	.542E+00
187 52 1 146EP01 243 65 66 1 992EP00 299 79 80 1 992EP00 188											.131E+00
188 5; 195 4 .7012F-00 244 65 209 7 .990F-00 100 79 222 4 .815.F-00 189 5; 195 1 .860F-01 256 65 301 1 .920F-01 301 79 301 1 .1112F-00 199 199 199 199 199 199 199 199 199 1											
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341	89 301				301	1	.840E-01		117	301	1	.840E-0	11
342			E-01 39		301	1	.840E-01	453	117	301	1	.840E-C	
343			E-01 39		105	1	.146E+01	454	118	119	1	.129E+0	11
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345	90 301			1 104		1	.840E-01	457	118	301	1	.840E-C	
346	90 301			2 105		1	.146E+01	458	119	120	1	.115E+0	
347	91 92	1 .146	E+01 40	3 105	249	4	.701E+00		119		4	.889E+0	
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364	95 239			0 109		1	.840E-01		124		1	.129E+0	1
365	95 301			1 109		1	.840E-01	477	124	268	4	.889E+0	0
366	95 301			2 110		1	.146E+01	478	124	301	1	.900E-0	1
367	96 97	1 .129		3 110		4	.701E+00	479	125	126	1	.146E+0	11
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371	97 98	1 .115	E+01 42	7 111	255	4	.701E+00		126			.146E+0	
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381	99 301								128	272	4	.701E+0	
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353 139 140 1 1.168-01 591 189 187 5 1.778-01 647 244 243 5 1.778-01 505 139 139 140 1 1.168-01 591 189 187 5 1.778-01 595 139 189 189 5 1.778-01 595 139 189 189 189 189 189 189 189 189 189 18						
536 139 283 4 .701E-00 592 189 188 5 .174E-00 549 245 244 7 .714E-00 549 277 139 101 1 .808E-01 39 150 189 5 .174E-00 401 201 201 201 201 201 201 201 201 201 2						
397 139 301 1 8006-01 993 190 189 5 1778E00 549 246 245 7 1778E00 530 140 144 1 1.605E01 549 151 180 5 1.778E00 549 246 245 7 246 5 1.778E00 549 246 245 7 246 5 1.778E00 549 246 245 7 246 5 1.778E00 549 249 249 249 249 249 249 249 249 249 2						
538 140 141 1 .106F001 594 191 190 5 .174E00 50 247 246 7 .174E00 50 259 140 244 4 .701E00 59 159 131 3 .174E00 50 250 248 247 5 .174E00 50 250 250 250 250 250 250 250 250 25						
309 140 284 4 .701E+00 995 192 193 5 .174E+00 951 292 194 5 .174E+00 952 195 285 197 194 91 91 91 91 91 91 91 91 91 91 91 91 91						
500 140 301 1 800-01 906 193 192 5 1.74E-03 693 203 208 208 7 1.74E-03 414 14 14 2 1 1.79E-01 93 97 194 393 9 1.74E-03 203 204 5 1.74E-03 204 194 194 194 194 194 194 194 194 194 19						
941 141 142 1 .178E-01 997 194 199 5 .174E-03 653 250 249 5 .174E-03 243 243 245 245 245 245 245 245 245 245 245 245						
542 142 285 4 .576F00 598 195 194 5 .174E00 552 251 5 .774E00 553 1421 42 1 .774E00 553						
543 142 143 1 .178E-01 599 194 195 5 .174E-03 593 252 251 25 .174E-03 44 142 264 4 .758E-04 50 157 186 5 .174E-03 505 252 252 25 .174E-03 505 254 142 264 4 .578E-04 50 157 186 5 .174E-03 505 252 25 .174E-03 505 254 25 .174E-03 505 255 254 254 254 254 254 254 254 254 25						
344 142 286 4 .578F00 600 197 196 5 .174E00 605 253 292 . 1.74E00 605 254 143 144 1 . 1.78E01 601 198 197 5 .174E00 605 254 233 5 .174E00 605 254 254 254 1 . 1.74E00 605 254 254 254 254 254 254 254 254 254 25						
945 140 144 1.178E-01 601 198 197 5.174E-01 697 254 253 5.174E-01 676 147 277 646 147 277 647 647 647 647 647 647 647 647 647 6						
346 143 287 4 .576E-00 602 199 188 5 .174E-01 509 255 294 7 .774E-00 7 .774E-						
\$47 144 288 4 .978F-00 603 200 199 5 .174E-01 699 256 255 5 .174E-02 689 248 249 249 249 249 249 249 249 249 249 249						
948 145 902 5 .174E+03 605 502 201 5 .174E+03 605 257 256 5 .174E+05 505 205 205 205 205 205 205 205 205 2						
549 146 145 5 .174E-03 609 202 201 5 .174E-03 601 209 208 7 .174E-03 501 219 227 7 5 .174E-03 501 174 146 7 .174E-03 601 209 208 8 .774E-03 601 209 208 174E-03 601 209 208 174E-03 601 209 208 174E-03 601 209 208 208 208 208 208 208 208 208 208 208						
950 147 146 5 .178E00 606 200 202 5 .178E00 602 209 25 .178E00 5 .178E00 5 .178E00 5 .178E00 602 200 5 .178E00 602 200 200 5 .178E00 602 2						
551 148 147 5 .174E+03 607 204 203 5 .174E+03 663 260 259 5 .174E+05 552 149 148 5 .174E+03 668 205 204 5 .174E+03 665 261 200 5 .174E+05 553 150 149 5 .174E+03 669 205 205 5 .174E+03 663 262 261 5 .174E+03 553 150 149 5 .174E+03 601 207 206 5 .174E+03 663 262 261 262 5 .174E+03 553 153 15 .174E+03 661 207 206 5 .174E+03 667 264 263 162 5 .174E+03 553 153 15 .174E+03 661 207 208 5 .174E+03 667 264 263 174E+03 667 264 264 264 264 264 264 264 264 264 264						
592 149 148 5 17948-03 608 205 204 5 17948-03 604 202 201 5 17948-05 5 150 140 7 17948-03 5 17948-03 605 201 10 17948-03 605 201 10 17948-03 605 201 10 17948-03 605 201 10 17948-03 605 201 10 17948-03 605 201 10 17948-03 607 2						
553 150 149 5 .174E+03 609 20e 205 5 .174E+03 669 222 261 5 .174E+03 6 .174E+						
554 151 150 5 .1748-03 610 207 206 5 .1748-03 666 263 262 5 .1748-05 55 152 151 5 .1748-04 612 208 5 .1748-03 555 152 151 5 .1748-04 612 208 5 .1748-03 667 264 201 3 .1748-05 556 153 152 5 .1748-05 612 209 208 5 .1748-03 668 265 264 5 .1748-05 575 154 153 5 .1748-05 612 209 208 5 .1748-03 669 265 265 5 .1748-05 578 155 154 5 .1748-05 612 210 209 5 .1748-05 609 266 265 5 .1748-05 589 155 154 5 .1748-05 614 211 210 5 .1748-03 670 267 266 5 .1748-05 599 156 155 5 .1748-05 155 212 211 5 .1748-03 71 268 267 5 .1748-05						
595 192 191 5 1.7424-03 611 208 207 5 1.7424-03 667 264 263 5 1.7424-03 595 193 192 5 1.7424-03 612 209 208 5 1.7424-03 668 265 264 5 1.7424-03 597 194 193 5 1.7424-03 613 210 209 5 1.7424-03 669 265 265 5 1.7424-03 588 195 194 5 1.7424-03 614 211 210 5 1.7424-03 670 266 5 1.7424-03 599 195 195 5 5 1.7424-03 615 212 211 5 1.7424-03 671 268 267 5 1.7424-03						
556 153 152 5 .174E+03 612 209 208 5 .174E+03 668 265 264 5 .174E+03 575 154 153 5 .174E+03 618 210 209 5 .174E+03 669 265 265 5 .174E+03 558 155 154 5 .174E+03 618 210 21 210 5 .174E+03 670 267 266 5 .174E+03 579 156 155 5 .174E+03 615 212 11 5 .174E+03 670 267 268 267 5 .174E+03						
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3 .1746703	500 157 156	J .1/4ETU3	010 213 212	3 .1/45703	U. 209 208	5 .1/4E+03

Brni	Fre	on To	Tag Conduct
673	270	269	5 .174E+0
674	271	270	5 .174E+0
675	272	271	5 .174E+0
676	273	272	5 .174E+0:
677	274	273	5 .174E+03
678	275	274	5 .174E+03
679	276	275	5 .174E+03
680	277	276	5 .174E+03
681	278	277	5 .174E+0
682	279	278	5 .174E+03
683	280	279	5 .174E+03
684	281	280	5 .174E+03
685	282	281	5 .174E+03
686	283	282	5 .174E+03
687	284	283	5 .174E+03
688	285	284	5 .174E+03
689	286	285	5 .174E+03
690	287	286	5 .174E+03
691	288	287	5 .174E+03

TASS GENERAL INPUT MENU - SI Units

(1) TALSR(METRIC)	Case Title: RUN 2. COMPLEX MODEL 149.7 kg/hr	(330	lbm/hr)
(2)	Nodes	28	88	
(3)	Constant Temperatures		2	
(4)	Unique Exponents		0	
(5)	Temperature Dependent Conductances		0	
(6)	Temperature Dependent Heat Inputs		0	
. (7)	Computational Accuracy	010	0	
(8)	Starting Temperature	25.	0	
Are	these inputs correct (Y/N) ? Y			

NODE	TEMPÉRATURE	ABSOLUTE VALUE OF THETA (b)
	(Celsius)	(Celsius)
5	26.34	13.66
6	26.63	13.37
7	26.91	13.09
8	27.19	12.81
9	27.42	12.58
10	27.62	12.38
11	27.77	12.23
12	27.88	12.12
13	27.95	12.05
14	27.98	12.02
15	27.97	12.03
16	27.93	12.07
17	27.85	12.15
18	27.73	12.27
19	27.57	12.43
20	27.38	12.62
21	27.15	12.85
22	27.01	12.99
23	27.02	12.98
24	27.29	12.71
25	27.52	12.71
26	27.7	12.3
27	27.84	12.16
28	27.93	12.07
29	27.99	12.07
30	28.04	11.96
31	28.07	11.93
32	28.1	
33 -	28.1	11.9
34 ·		11.88
35	28.13 28.14	11.87
35		11.86
36	28.15	11.85
	28.15	11.85
38	28.15	11.85
39	28.14	11.86
40	28.12	11.88
41	28.09	11.91
42	28.04	11.96
43	27.94	12.06
44	27.77	12.23
45	27.61	12.39
46	27.78	12.22
47	27.93	12.07
48	28.03	11.97
49	28.13	11.87
50	28.19	11.81
51	28.24	11.76
52	28.27	11.73

53	28.3	11.7
54	28.32	11.68
55	28.34	11.66
56	28.35	11.65
57	28.37	11.63
58	28.38	11.62
59	28.39	11.61
60	28.41	11.59
61	28.42	11.58
62	28.44	11.56
63	28.47	11.53
64	28.5	11.5
65	28.56	11.44
66	28.8	11.2
67	28.98	11.02
68	29.04	10.96
69	29	11
70	28.78	11.22
71	28.53	11,47
72	28.31	11.69
73	28.32	11.68
74	28.57	11.43
75	28.83	11.17
76	29.07	10.93
77	29.14	10.86
78	29.09	10.91
79	28.93	11.07
80	28.72	11.28
81	28.68	11.32
82	28.67	11.33
83	28.66	11.34
84	28.66	11.34
85	28.66	11,34
86	28.67	11.33
87	28.67	11.33
88	28.68	11.32
89	28.68	11.32
90	28.68	11.32
91	28.68	11.32
92	28.68	11.32
93	28.67	11.33
94	28.66	11.34
95	28.63	11.37
96	28.59	11.41
97	28.51	11.49
98	28.43	11.57
99	28.31	11.69
100	28.17	11.83
101	28.34	11.66
102	28.52	11.48

103	28.63	11.37
104	28.69	11.31
105	28.74	11.26
106	28.78	11.22
107	28.8	11.2
108	28.82	11.18
109	28.84	11.16
110	28.85	11.15
111	28.85	11.15
112	28.86	11,14
113	28.86	11,14
114	28.85	11.15
115	28.84	11.16
116	28.81	11.19
117	28.77	11.23
118	28.7	11.3
119	28.58	11.42
120	28.44	11.56
121	28.25	11,75
122	28.01	11,99
123	28.02	11.98
124	28.16	11.84
125	28.4	11.6
126	28.59	11.41
127	28.74	11.26
128	28.87	11.13
129	28.96	11.04
130	29.01	10.99
131	29.03	10.97
132	29.02	10.98
133	28.97	11.03
134	28.89	11.11
135	28.77	11.23
136	28.61	11.39
137	28.4	11.6
138	28.17	11.83
139	27.92	12.08
140	27.67	12.33

10 10 10 10 10 10 10 10	0.318	0.015		(With K)			(ma)	(cm) (cm)	(80 cm)
		THE REAL PROPERTY.	0.053	4.01	1900.00000	0.707	0.635	0.483	0.535
Company Comp	at Pin Sharting Patri	Channel With (b)	Effective Diameter		ε	Lambda	R-Thora	tra-Tarm	b1-Term
		(cm)	(m)		(1/km)			(cm)	(423)
	I	1143	0.10192	0 03626	1,08929	3.473	1.142	0.461	0.6802
	ī	1.143	0.10192	0.03626	1.08929	3.473	1.123	0.475	0.668
	7:40	1.143	0.10192	0.03626	1.08929	3.473	1.102	0.491	0.662
	6.39	1.143	0.10192	0.03626	1,08929	3.473	1.030	0 508	0.635
	25.0	1.143	0.10192	0.03626	1,06929	3,473	1.062	0.522	0.621
	10-37	1.143	0 10192	0.03626	1,06929	3.473	1.045	0.535	0.608
	8:1	1.143	0.10192	0.03626	1,06929	3 473	1 032	0.545	0.598
	12.35	1.143	0.10192	0.03626	1,08929	3 473	1.022	0.563	0.550
	15.34	1.143	0.10192	0.03626	1,08929	3.473	1015	0.559	0.584
	14-33	1.143	0.10192	0.03626	1,08929	3 473	1.012	0.562	0.581
	15-32	1.143	0.10102	0.03626	1,08929	3.473	1.011	0 562	0.581
	16-31	1.143	0.10192	0.03626	1,06929	3,473	1.012	0.562	0.581
	17.30	1.143	0.10192	0.03626	1,00929	3.473	1.016	0.550	0.585
	18.20	1.143	0.10192	0.03626	1,06929	3.473	1.022	0.553	0.590
	19.28	1.143	0.10192	0.03626	1,06929	3.473	1 030	0.547	0.596
	20-53	1.143	0.10192	0.03626	1,08929	3 473	1038	0.541	0.602
	21-26	51.0	0.10176	0.03629	1,06966	3.331	1.045	0.514	0.590
	22-25	0.008	0.10008	0.03670	1,09500	2.425	1.041	0.360	0.448
	20.54	0.236	0.0000.0	0.03928	1.13381	1300	1.021	0.093	0.203
	24-67	2.037	0.10396	0.03578	1.08214	990'6	1,153	0.036	1.101
	25-66	1.496	0.10001	0.03600	1,08545	5.075	1.154	979.0	0.822
14 15 15 15 15 15 15 15	28-85	1.104	0.10238	0.03622	1,08973	0.630	1.075	0 634	0.651
	27.04	1.143	0.10192	0.03626	1.01029	3 473	1.057	0.525	0.618
1	28-63	1.143	0.10192	0.03626	1.08929	3.473	1047	0.503	0.610
14 15 15 15 15 15 15 15	29-62	1.143	0.10192	0.03626	1.08929	3.473	1,039	0.540	0.603
	19-00	1.143	0.10192	0.03626	1.01020	3,473	1,033	0.545	0.508
141 10160 1000 1100 1010 1010 1010 1010	3140	1.143	0.10192	0.03626	1.08029	3,473	1,029	0.548	0.505
144 0 01918 00000 1410 1417 0504 141	32.50	1.143	0.10102	0.03626	1.08929	3 473	1025	0.551	0.592
143 (144) (145) (1	33-56	1.143	0.10192	0.03626	1.08929	3.473	1,022	0.553	0.560
110 01010 00010 140000 1401 100 00010 140000 1401 100 00010 140000 1401 100 00010 1401	24.57	1,143	0.10102	0,03626	1.09929	3.473	1.021	0.554	0.549
1140 (1010) (1000) (1000) (1000) (101	05-50	1,143	0.10102	0.03626	1,08929	3.473	1.018	0.557	0.586
1.443 6.10172 0.03026 1.00029 3.473 1.015 0.559 1.443 0.10172 0.03026 1.00029 3.413 1.013 0.561 1.443 0.10172 0.03026 1.00029 3.413 1.011 0.602	35.50	1.143	0.10192	0.03626	1,09929	3.473	1.016	0.558	0.585
1,443 0,1019Z 0,01026 1,08928 3,473 1,013 0,561 1,443 0,1019Z 0,01026 1,0828 3,473 1,011 0,562	37.54	1.543	0.10192	0.03626	1.08929	3,473	1,015	0.559	0.564
1.143 0.10142 0.04626 1.08929 3.473 1.011 0.592	34.53	1,143	0.10192	0.03626	1,08929	3,473	1.013	0.561	0.562
	39-52		0.40469	909000	0.0000	24.44	101	0.660	0.581

0.578	0.578	655.0	0.418	0.185	1,403	0.960	0.645	0.004	0.603	0.602	0.600	0.500	0.566	0,366	0.000	100	0.593	0.59%	0.500	0.589	0.567	0.546	0.000	0.563	0.561	0.560	0.570	0.576	0.800	0.407	0.151	976.0	67.6	0.000	0.873	0.579	0,582	0.505	0.505	0.505	0.566	0.564	0.564	0.563	0.582
9950								•	0.540	0.541	0.543	7.0	0.75	0.547															0.540					0.602				_							199.0
1001		1008		-	1045	-	-	1,040	-	-	-	-	-						1,022					-			1,009		1001				9960								-		-	-	1013
1000		3331		1388				3.473											3473				-										\$ 5075												3473
00000	0.00000	1.08085	1.00696	113381	1.07832	1 06307	1.06820	1,08923	1,009029	1,08929	1 00929	1,08229	1,00000	1.08029	1.0000.0	1.06929	1.0980.1	1 (0000)	1,00020	626931	1,08929	0.00000	1 08809	626921	1,08829	628031	1,001029	1,08929	1,08665	1,00600	19261	1.08214	1.08545	1.08673	62890 1	62880	1,08024	1.08029	1.08929	1 08828	1.08829	1,00022	1.08929	1,06929	1.08928
919190	0.03676	0.0500	00000	0.03928	0 03200	0.03584	819000	0.03626	003600	909000	603628	60,03626	909000	0.03626	0.03628	0.03626	929000	0.03628	0.03626	0.03626	909000	903030	0.03626	0.03626	0.03626	0.03626	979600	979000	629000	0.03670	0.03928	0.03578	0.03600	0.03622	0.03626	0.03626	0.03626	0.03626	0.03626	0.03678	903000	0.03626	0.03626	0.03626	363636
Of south	0.000	0.10192	0.10170	0.00008	0.10477	0.10369	0.10223	0.10192	0.10102	0.10192	0.10102	0.10102	0.10102	0.10192	0.10192	0.10102	0.10192	0.10192	0.10102	0.10102	0.10102	0.10192	0 10162	0 10192	0.10102	0.10102	0.10102	0.10102	0.10176	0.10001	0.09038	0.10396	0.10301	0.10208	0.10102	0.10192	0.10192	0.10192	0.10192	0.10102	0.10192	0.10192	0.10192	0.10192	001010
	200	2	1000	0.000	2001	9991	1 225	1.163	110	91.	1160	1163	1.163	1.163	1.163	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1 143	1.143	1,143	1143	101	0.606	0.206	2.007	1.496	1.184	1.143	1,143	1.143	1143	1.143	1.143	1.143	1143	1.143	1.143	
1	3	42.49	5 49	1	8	0.00	10.00	90.04	20.08	200	10.03	20.03	10.00	99 99	20-03	57-68	18.87	20.02	50.00	9194	62.43	63-42	18.40	02-40	66.79	67.78	46.77	82.48	70.75	71.74	13.73	18.121	79-120	90-119	91-118	2.117	33-116	34.116	26.114	113	0.112	10.00	0110	90-109	

20020 0.00162 0.00162 0.00162 0.00068 0.00068 0.00162 0.0016 60-106 60-108 60

Pharmal Conductivity of Copper (RFloyrodis Humber Practit Name pipe dismeter from pipe dementer Pharmal Conductivity Pharmal Conduc	Heal Trender Coulifices (1) b Term You Discheese Hoose Franciste	need hand	0.834	1260 0367 NA	0.6600 0.01314 0.367	0.65200 0.01291	0.60282 0.367	0.63500 0.01266 0.367	00000 00000 00000 00000	0.00007 0.367	0.60800 0.01226 0.367	2900 961100	0.00626 0.50009 0.01210 0.347 0.350	0.59000 0.01198 0.367	0.01354 0.367	0000 0000 00000 00000 00000 00000 00000 0000	0.000 0.000 0.000	2000 01910'0	0,58100 0,01164 0,587	001100	0.5000 0.01196 0.367	0.6960 0.01207 0.367	900000	0.465	. 0.465	0.59000 0.01199 0.465 7	0.44800 0.00958 0.465	0.20300 0.00496 0.465	1.10100 0.01745 0.465	0.09300 0.00231 0.465	0.01501 0.465	
Fin Thickness Fin specing (2) The (cm) (cm) 0.015 0.0533	Cleavel With (b) Effective Demoker			0.000					0.0800				0.1019			0.1019			0.1019	0.0101		0.1019	0.00									

			0.00000	0.01400		******	195.0	0 880	0.0400
×42	2:	0.1010	979500	0.64400		000000	2960	0.000	0.0000
2	2	0.1010	0.0000	00000		001100	200.0	0.840	0.0001
***	2	0.101.0	0.00000	0 640 60		001100	200.0	0.660	0.0613
443	911	0.1010	0.0000	00000		01010	0.00	0.000	0.0674
		0.010	0.03676	0.65300		01139	0.367	0 880	0.0620
2	9	91010	0.03626	0.59800		01210	0.80	0990	0.0000
K40	911	01010	0.03626	0.55800	•	01147	0.367	0.860	0.0625
866	1160	0.010	929000	0.59500	۰	01206	0.367	0990	99900
199	31.	0.0010	929600	0.56200	۰	0.01163	0.357	0 600	0.0000
683	1.143	0.1010	929000	0.53200		0.01201	4,357	0.660	0.0002
KSS	1.143	0.1010	0.03626	0.56200		0.01163	0.367	0.560	00000
X	1.143	0.1010	0.00626	0.50000		0.01194	0.367	0.880	000000
K36	1.143	0.1010	0.00626	0.56200		0,01163	0.367	0.000	0.0830
K56	1.143	0.1010	0.00628	0.58300	-	0.01106	0.367	0.880	93800
K57	1.143	0.1010	0.03626	0.85900	0 1	0.01148	0.367	0.000	97970
K58	1.143	0.1010	0.00628	0.59860		0.01192	/800	000	0.000
K539	1.143	0.1010	0.03626	0.55300		01130	0.307	0000	0.000
K80	1.143	0.101.0	0.03626	0.58500		001100	0.367	0.000	9000
193	5.145	0.1019	9791070	0.54500		0.01126	0.367	0.080	0.000
K62	1.16	0.1019	900000	0.55400		0.01166	0.387	0.880	0,0854
KGS	61.6	0.1010	0.03626	0.53560		0.01109	0.387	0.000	0000
KEA	21.1	0.1010	0.03626	0.58200		591100	0.387	0.000	0.0862
KES	1.143	0.1019	0.03628	0.52200		5,01067	0.367	0.000	0.0764
99X	51.1	0.1019	0.03626	0.58100	•	0.01184	0.367	0.000	0.0850
699	1.143	0.010	0.03626	0,50800	•	0,01063	0.367	0.000	0.0786
939	1113	0.1010	0.03626	0.58000	۰	0.01102	0.367	9.860	0.0540
KARO	1113	0.1010	0.03626	0.49100		0.01034	0.367	6.000	0,074.7
670	1.143	0.1010	0.03626	0.57800		0.01179	0.367	0.000	0.0847
101	1,143	0.1010	0.03626	0.47500		0.01005	0.367	6.880	0.0728
203	1.143	0.1010	0.03626	0.57800		0,01179	0.367	0.000	0.0547
K73	1163	0.1010	9/3/00/0	0,46100	•	0.00000	0.387	0.000	0.0711
0	100	0.1016	0.03629	0.55900	•	0.01150	0.445	7.540	0.0907
40x	0.846	0.1006	0.03657			0.01591	0.465	7.540	0.1240
KZB	996.0	0,1001	0.03670	0.41800		5,00011	0.465	2.040	0.0726
101	9980	0.0973	0,03741		0	5,01167	0.465	2.540	0,0821
808	0.296	0.0000	0.03528	0.18500	0	0,00455	0.466	2,540	90000
808	2 931	0.1046	0.03560	1,48800	0	0,01932	0.465	1 540	0.1480
KORO	0.296	0,0904	0.00928	0.11150	•	0.00275	0.405	1340	0.0251
KB1	1,850	0.1037	0.00564	020560	۰,	929100	0.465	250	0 1769
XBZ	0.808	0.1001	0.09670	0.33000	٠.	0.00887	0,465	1 540	0.000.0
KBS	1225	0.1022	0.03618	0.64500	0	0.01279	0.465	2 540	0.1004
KRA	1.504	0.101.8	0.03629	0.54500	0	0.01127	0.465	7.540	0.0500
5426	1163	61010	0.03626	0.60.620	۰	002250	0.387	0999	0.0975
242	11.0	91010	929000	0.8990	0	0.01158	290 0	6 860	0.0833
685	1.143	0.1019	0.63626	0.60330	٥	0.01218	0.367	6.860	0.0074
XXX	1,143	61010	0.03626	0.56500	٥	001158	195.0	6 880	0.0033
KAD	1163	0.1019	0.03626	0.60200	۰	0.01216	0.367	6,860	0.6673
95%	1,143	0.1019	0.03626	0.56300	•	0.01155	0.367	6,880	0.0631
×	1.143	0.1019	0.03626	0,64000	٥	0.01213	0 367	0.050	0.0871
COM	13.63	61010	0.03626	0.56200	۰	0.01153	0,367	6 880	0.0830
880	1.143	0.1019	0.03626	0.59200	۰	0.01212	0.367	0.000 0	0.0870

		0.4010	0.09626	0.56100	0.01152	0.367	0.680	92800
Y.	2 9	0.1019	909000	0.59600	0,01210	0.367	6.550	0.0069
200	100	0.1019	0.09826	0.55000	0.01148	0.367	0999	0.0826
	1163	0.1019	900000	0.5960	0.01207	0.367	0.000	0.0067
200	91.	0.1019	0.00626	0.55800	0.01147	0.367	0.880	0.0625
1000	2	0.1019	0.03626	0.59500	0.01206	0.367	0.600	99900
K100	21.1	0.9010	929000	0.55700	0.01145	0.367	0.880	0.0624
K101	1.163	0.1010	0.03626	0.59400	901104	0.367	0.800	00000
K102	1.143	0.1019	0.03626	0.55400	0.01140	0.367	0.800	17000
K103	1.143	0.9910	0.03626	0.59300	0.01202	0.367	0.880	00000
K104	1.143	0.1010	0.03626	0.55300	0.01139	0.367	0.000	0.0000
K105	1.143	0.1010	0.03626	0.5250	102100	0.207	9 100	0.0017
K106	1.143	0.1010	0.03626	0.55100	0.01135	0.307	0 800	10000
KNOV	1.143	0.1010	0.03626	0.59000	0.01100	0.367	0 0 0 0	0.000
K108	1.143	0.1010	0.03626	0.54800	001100	0.00	0 840	0.0000
931X	116	0.0010	0.03626	0.00000	001100	0.767	0 840	0.000
K110	217	0.1010	0.03626	0.54500	001100	0.767	0 880	25000
K111	21.5	0.6010	0.03026	0.0070	20000	0.767	0.880	30990
K112	21.1	0.1010	0.03626	0.58000	001100	0.167	0 800	95920
K113	24.	0.6010	0.00000	0.00000	20100	0.767	0 880	26100
K114	21.1	0.1010	979670	20000	201100	9090	MM	01901
KIIS			20000	0.5950	001100	0.367	0.880	25000
K116	2:	0.9019	0.00000	0.62860	0.01002	0.367	0.660	0.0765
K117	25.7	6,1619	NIA.			0.541	MM	0.992
K118			1.000			0.518	MM	0860
8118	****		0.0000	0.647/0	0.01187	0.541	7.540	0.0005
K120	2	2000	0.00000	0.63470	001100	0.541	7.540	0.0674
KIZI	11.164	0.1021	O COREZA	20000	201100	0.312	N.N.	1.717
KIZZ			1 340			0.427	NN	0.815
675		0.1010	0.00026	0.58100	0,01164	0.312	7.540	0.0003
K174		0.5030	0.00800	0.67400	901314	0.312	7.540	0.1031
2170	2480	0.1000	NW			0.255	N.A.	2,100
2010			1.286			0.284	×2	0.542
200	1143	91010	929000	0.58300	0.01182	0.255	7.540	10000
W130	2.037	0.1040	975000	0.93600	0.01610	0.255	7.540	0.1254
K130			NOA			0.429	¥2.	1231
K131			1.260			0.343	NA A	0000
K132	1.143	0.1019	0.03626	0.57800	0.01181	0.420	0.000	20000
K133	2.007	0.10476	000000	•	0007700	0.40	MA	1390
K134			20000	0.0000	0.01176	0.420	0000	66000
K135	91	0.1019	0.0000	200	0.0207	0.429	0.040	0.1712
2130	7947	0.1018	0.00029	0.55500	001143	0.465	7.540	0.0902
97.70		0.10368	0.005666		0.02025	0.465	7.540	0.1567
200	0 808	0 1001	0.000.0	0.49750	0.00690	0.465	7.540	0.0712
0.00	1 110	0 10162	0.00628		0.01775	0.465	7.540	0.1378
200	0.298	0.0000	0.09926	0,15100	0.00373	0.465	7.540	0.0325
K142	0.359	0.09288	0.03857		0.00634	0.465	7.540	0.0672
KIRI	0.296	10000	0.09926	0.14500	0.00358	0.465	7.540	9,0314
K144	0.608	0.1001	0.00670	0.40100	0,00679	0.485	7.540	0000
K145	100	0.1018	0.03629	0.54900	0.01133	0.465	7.540	20000

0				0						0.0846		0.860 0.0852			0.0821		07000 0000	00000	0.000	0.000		0.000	0.000 0.000 d	0.000 0.0014	6,680 0.0853	6,060 0,0813	6,890 0.0862	0.000 0.0010	0.000 0.000	0.0800	0.000		0	0.0845														6.880 0.0763
0.429	629.0	0.255	0.255	0.512	0.512	0.541					0.347	0.367				0.387	0.387	0.387	2000	2000	191		0.367	0.367	0367	0.387	0.367	0.367	0.367	0.367	0.367	2000	0.00			0.367	0.367	0.466	0.465	0.466							4944	
0.01161	0.01157	0.01647	0.01155	0.01375	0.01153	0.01184	0.01150	0.01171	0.01147	0.01181	0.01145	0.01185	0.01144	0.01190	0.01140	0.01190	001130	001100	001139	2000	90000	001100	001150	0.01130	0.01187	0.01129	0.01165	0.01126	0.01164	0.01124	0.01162	221100	011100	0.01176	0.01117	0.01174	0.01116	. 001140	0.01160	0.00367	0.01577	0.00288	0.01917	0.00443	0.00002	0.01136		00100
0.56700	0.56400	003260	0.56300	0.71900	0.56200	0.58200	0.56600	0.57303	0.51600	0.67600	0.56700	0.58200	0.55600	0.58500	0.55400	0.58500	0.55300	0.56500	0.50100	0.0000	0.0000	0.0000	0.0000	0.54000	0.58300	0.54700	0.56200	0.54500	0.56100	0.54400	0.56000	0.54300	00700	0.67600	0.54000	0.57500	0.63900	0.55330	0.56000	0.39500	0.80000	0.11600	1,44400	0.16000	0.41303	0.55100	0.00000	0.53400
0.03626	0.03626	0.03578	0.03626	0.03600	0.03626	0.03622	9,03600	929600	929600	0.03626	0.03626	0.03628	0.03600	0.03626	929600	0.03626	0.03626	0.0360/6	929600	909000	0.0000	079660	0.00000	0.0100	003600	0.03626	9/39/0/0	0.03628	0.03629	0,03626	0.03626	0.03628	0.03626	COLOROR	903600	0.03600	0.03626	0.03629	0.03618	0.03670	0.00564	0.03926	0.03560	0.03926	0.00670	629000		979000
0.9319	0.1010	0.1040	0.1010	0.1030	0.1019	0.1021	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.1010	0.0010	0000	0.1010	01010	01010	0.1019	0.1010	0.1019	0.1010	0.1010	0.1010	0.000	01010	01010	0.1019	0.1016	0.1022	0 1001	0.1037	0.0904	0.1048	0.0004	0.1001	0.1016		0.1010
1.143	1.163	2007	1.143	1.400	1.143	191	1.145	21.1	1.143	1.145	1.145	271.1	1.163	1145	21.5	1143	21.1	5143	21.5	2	2	2	2	2 3	911	911	1143	1143	1143	1.163	1.143	3.5	9		91.	671	245	3	225	9990	1.850	0.296	2.931	0.296	0.808	1.104		1.143
K146	K147	K148	K149	81X	K151	K152	K153	X	K155	K156	K157	K156	K156	K160	K161	X162	K163	X164	X165	× 186	K167	×166	W 100	217	200	K433	K174	K175	K178	K177	K178	K170	X180	NIB.	2 5	791.7	W186	K186	KIE	KIW	KIND	81X	K191	×192	×103	× 104		200

				0.00000	0.01101	494.0	0 880	20000
K108	1.143	0.1019	0.03626	90000	001100	0.007	0.000	0.0794
31.8	2	0.1010	0.0000	0 56600	0.01160	0.367	6.880	0.0634
200		0.1010	0.03606	0.54400	0.01124	0.367	9 990	60900
2000		0.010	0.03626	000990	0.01155	0.367	6.880	0.0631
1000	911	0.1010	903626	0.55700	0.01145	0.367	6.880	0.0624
2024	31.	0.1010	909000	0.56230	0.01153	0.367	0.000	0.0830
KOS	21.1	0.1010	0.03626	0.56830	0.01163	0.367	0.880	0.0636
K206	1.143	0.1010	9/360/0	0.56100	. 001152	0.367	0.880	0.0000
1000	1.143	0.1019	0.03626	0.67600	0.01176	0.367	0.000	0.0840
A238	1.143	0.1010	0.03626	0.56000	001100	1000	2000	0000
K200	1.143	0.1019	90000	0.36100	90000	1000	0.000	0.000
4210	31.	0.1010	0.00000	0.00000	001180	0.367	0.000	0.0854
1121	21.5	0.1010	0.00000	0.0000	001140	/W 0	6.880	0.0826
222	2	0.010	0.00000	0.58400	0.01166	0.387	0.880	0.0854
710	31	0.1010	0.03626	0.55803	0.01147	0.387	0.880	0.0825
210	25	01010	0.03626	0.56300	0.01167	0.367	0.880	0.0853
N216	1143	0.1019	0.03626	0.55603	0.01147	0.367	0.880	0.0825
2121	1.143	0.1010	92900'0	0.56000	0.01182	0.387	0.880	0.0540
8218	1.143	0.1010	0.03626	0.56800	0.01147	/95'0	0.080	9000
K219	1.143	0.1010	909600	0.57400	0.01173	0.387	0.860	0.0843
KZN	110	0.1019	0.03626	0.16800	0.01147	796.0	0.000	0.0826
K221	1.143	0.1010	0.03626	0.86700	0.01161	0.367	0.800	0.0036
K222	51.63	0.1010	0.03626	0.16100	0.01152	0.367	0.800	0.0828
K223	1.143	0.1019	0.03626	0.55600	0.01147	0.367	6.880	0.0825
K224	1.143	0,1010	903600	0.56403	0.01157	0.367	0.800	0.0832
K225	1149	0.1019	0.0 MQ6	0.56000	0.01134	0.367	6.880	0.0316
K228	1143	0,1019	903600	0.57006	0.01166	0.367	0.860	0.0836
K227	1 104	0.1016	0.03629	0.52230	0.01066	0.465	2.540	0.0861
K228	1.184	0.1021	0.03622	0.60200	0.01216	0.480	200	0.0950
K229	0.846	0.1001	0.03670	0.36500	0.00000	0.465	200	0.0000
K230	1,450	0.1030	0,03600	0.77800	0.001440	0.440	3	0.020
K231	0.250	0.0904	0,03028	0.09400	0.00234	0.440	200	0.000
K232	2.037	0.1040	0,03578	1,00100	00000	9 77	2 640	0.0417
233	0.266	00000	0.01428	0.4490	000000	0.446	7.540	0.0763
1034	9090	0.1001	0.03670	0.0000	001166	0.465	2.540	0.0936
200		0.1010	003606	0.56330	0.01202	0.367	6.880	0.0863
K237	33,	0.1010	0.03628	0.58500	0.01150	0.367	6.860	0.0665
NC338	91.	0.1010	0.03626	0.67630	0.01178	0.367	6.880	0.0845
KCN	1163	0.101.0	0.03626	0.56900	0.01165	0.367	6.860	0.0637
824D	1163	0.1019	0.03626	0.56330	0.01155	0.367	6,860	0.0631
1241	1.143	0.1019	0.03626	0.56030	0.01150	0.367	6.880	0.0627
1242	1.143	0.1019	0.03626	0.55900	0.01148	0.367	6.860	0.0826
1243	1.143	0.1019	0.03626	0.55900	0.01140	0.367	6.860	0.0626
K244	115	0.1019	0.03626	0.56000	0.01153	0.367	6.880	0.0630
8245	1143	0.1019	9/03/070	0.55700	0,01161	0.367	6.880	0,0835
K246	1.163	0.1019	979000	0.67500	0.01174	0.367	989	0.0044
N247	1.143	0.1019	9/39000	0.58600	0.01182	0.367	0880	90000
KZ48	1143	0.1019	0,03626	000000	0.01212	1000	0,000	0.0000
W249	116	0.1019	907/09	061200	0.01200	0.36.	0.00.0	Collect

0.094 0.0911 173.8800

6.886 6.886 N.A.

0.367 0.367 N.M.

0.01272 0.01272 NA

0.62990 0.63900 NIA

0.03626 0.03626 NA

0.1010 0.1010 NA

3 3 ¥

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BRANCH		TON	TAG	I, C, S	BRANCH		TON	TAG	1, C, S
1	1	2	1	K1	51	16	17	1	S9
2		145	4	K2	52		160	4	S10
3	2	3	1	S1	53		301	1	K25
4		146	4	S2	54		301	1	S38
5	3	4	1	S1	55	17	18	1	S9
6		147	4	S2	56		161	4	S10
7	4	5	1	K3	57		301	1	K26
8		148	4	S2	58		301	1	S34
9	5	6	1	K4	59	18	19	1	S9
10		149	4	K5	60		162	4	S10
11		301	1	K6	61		301	1	K27
12	6	7	1	S9	62		301	1	S30
13	-	150	4	S10	63	19	20	1	S9
14		301	1	K7	64		163	4	S10
15	7	8	1	S9	65		301	1	K28
16		151	4	S10	66		301	1	S26
17		301	1	K8	67	20	21	1	K29
18		301	1	K9	68	20	164	4	S10
19	- 8	9	1	S9	69		301	1	K30
20	-	152	4	S10	70	_	301	1	S22
21	_	301	1	K10	71	21	22	1	K31
22		301	1	K11	72	21	165	4.	K32
23	9	10	1	S9	73		301	1	K33
24		153	4	S10	74	22	23	1	S71
25		301	1	K12	75	- 22	166	/ 4	S72
26	_	301	1	K13	76	-	301	1	K34
27	10	11	1	S9	77	23	24	1	S71
28	10	154	4	S10	78	23	167	4	S72
29	_	301	1	K14	79		301	1	K35
30		301	1	K15	80	24	25	1	S71
31	11		1	S9	81	24	168	4	S72
32	11	155	4	S10	82	_	301	1	K36
33	-					_			K37
34	_	301	1	K16	83	25	301	1	S71
35	40	301	1	K17	84 85	25	169	4	S72
	12	13	1	S9			301	1	K38
36	_	156	1	S10	86			1	K38
37	-	301		K18	87	- 00	301		K39 S67
38	- 10	301	1	K19	88	26		1	S67
39	13	14	1	S9	89		170	4	K40
40	_	157	4	S10	90		301	1	K40
41		301	1	K20	91	27	301	1	K41
42		301	1	K21	92	21	28 171	4	
43	14	15	1	S9	93	-		1	S10 K42
44		158	4	S10	94	_	301		K42
45		301	1	K22	95		301	1	
46		301	1	K23	96	28	29	1	S9
47	15	16	1	S9	97	_	172	4	S10
48		159	4	S10	98		301	1	K44
49		301	1	K24	99		301	1	K45
50		301	1	S42	100	29	30	1	S9

BRANCH	NODE	TON	TAG	1, C, S	BRANCH	NODE	TON	TAG	I, C, 3
101		173	4	S10	151		301	1	K71
102		301	_1_	K46	152	42	43	1	S67
103		301	1	K47	153		186	4	S10
104	30	31	. 1	S9	154		301	1	K72
105		174	. 4	S10	155		301	1	K73
106		301	1	K48	156	43	44	1	\$71
107		301	1	K49	157		187	4	S72
108	31	32	1	S9	158		301	1	K74
109		175	4	S10	159		301	1	K75
110		301	1	K50	160	44	45	1	S71
111		301	1	K51	161		188	4	S72
112	32	33	1	S9	162		301	1	K76
113		176	4	S10	163		301	1	K77
114		301	1	K52	164	45	46	1	S71
115		301	1	K53	165		189	4	\$72
116	33	34	1	S9	166		301	1	K78
117		177	4	S10	167	46	47	1	S71
118		301	1	K54	168	-	190	4	S72
119		301	1	K55	169		301	1	K79
120	34	35	1	S9	170		301	1	K80
121		178	4	S10	171	47	48	1	S71
122	_	301	1	K56	172		191	4	S72
123		301	1	K57	173		301	1	K81
124	35	36	1	S9	174		301	1	K82
125		179	4	S10	175	48	49	11	S67
126		301	1	K58	176		192	4	\$72
127	_	301	1	K59	177		301	1	K83
128	36	37	1	S9	178		301	1	K84
129	- 00	180	4	S10	179	49	50	1	S9
130		301	1	K60	180	70	193	4	S10
131		301	1	K61	181		301	1	K85
132	37	38	1	59	182		301	1	K86
133	J.	181	4	S10	183	50	51	1	\$9
134		301	1	K62	184	- 50	194	4	S10
135		301	1	K63	185	-	301	1	K87
136	38	39	1	59	186		301	1	K88
137	100	182	4	S10	187	51	52	1	S9
138	-	301	1	K64	188	- 1	195	4	S10
139	-	301	1	K65	189		301	1	K89
140	39	40	1	S9	190	-	301	1	K90
141	79	183	4	S10	191	52	53	1	S9
142	-	301	1	K66	192	36	196	4	S10
	-	301	-	K67	193	_	301	1	K91
		41	1	S9	194	_	301	1	K92
143	40					53			
143 144	40								
143 144 145	40	184	4	S10	195	53	54	1	S9
143 144 145 146	40	184	4	K68	196	53	197	4	S10
143 144 145 146 147		184 301 301	1 1	K68 K69	196 197	53	197 301	4	S10 K93
143 144 145 146	40	184	4	K68	196	54	197	4	S10

BRANCH	NODE	TON	TAG	I. C. S	BRANCH		TON	TAG	I. C. S
201		301	1	K95	251	67	68	1	K126
202		301	1	K96	252		211	4	K127
203	55	56	1	S9	253		301	1	K128
204		199	4	\$10	254		301	1	K129
205		301	1	K97	255	68	69	1	K130
206		301	1	K98	256		212	4	K131
207	56	57	1	S9	257		301	1	K132
208		200	4	S10	258		301	1	K133
209		301	1	K99	259	69	70	1	K134
210		301	1	K100	260	- 00	213	4	S256
211	57	58	1	S9	261		301	1	K135
212		201	4	S10	262		301	1	K136
213		301	1	K101	263	70	71	1	S71
214		301	1	K102	264	- 10	214	4	S72
215	58	59	1	S9	265		301	1	K137
216	- 00	202	4	S10	266		301	1	K138
217		301	1-	K103	267	71	72	1	S71
218		301	1	K104	268	- / 1	215	4	S72
219	59	60	1	S9	269		301	1	K139
220	39	203	4	S10	270		301	1	K139
221	_	301	1	K105	271	72	73	1	S71
222	_	301	1	K105	272	12	216		
223	60	61	1	S9	273			4.	S72
224	00	204	4	S10	274		301	1	K141
225		301	1	K107	274	73	301 74	1 1	K142
226						73			S71
227	- 04	301	1	K108	276		217	4	S72
	61	62	1	S9	277		301	1	S274
228		205	4	S10	278		301	1	K143
229		301	1	K109	279	74	75	1	S71
230		301	1	K110	280		218	4	S72
231	62	63	1	S9	281		301	1	S270
232	_	206	4	S10	282		301	1	K144
233		301	1	K111	283	75	76	1	S259
234		301	1	K112	284		219	4	S72
235	63	64	1	S9	285		301	1	S266
236		207	4	S10	286		301	1	K145
237		301	1	K113	287	76	77	1	S255
238		301	1	K114	288		220	4	S256
239	64	65	1	K115	289		301	1	S262
240		208	4	\$10	290		301	1	K146
241		301	1	K116	291	77	78	1	S251
242		301	1	K117	292		221	4	S256
243	65	66	1	K118	293		301	1	S258
244		209	4	K119	294		301	1	K147
245		301	1	K120	295	78	79	1	S247
246		301	1	K121	296		222	4	S252
247	66	67	1	K122	297		301	1	K148
248	70	210	4	K123	298		301	1	K149
249		301	1	K124	299	79	80	1	S243
250	_	301	1	K125	300		223	4	S248

BRANCH	NODE	TON	TAG	I.C.S	BRANCH	NODE	TON	TAG	1. C. S
301		301	1	K150	352		236	4	S10
302		301	1	K151	353		301	1	K176
303	80	81	1	S239	354		301	1	K177
304		224	4	S244	355	93	94	1	S9
305		301	1	K152	356		237	4	S10
306		301	1	K153	357		301	1	K178
307	81	82	1	S9	358		301	1	K179
308		225	4	S10	359	94	95	1	S9
309	-	301	1	K154	360		238	4	S10
310	_	301	1	K155	361		301	1	K180
311	82	83	1	S9	362		301	1	K181
312		226	4	S10	363	95	96	1	S9
313		301	1	K156	364		239	4	S10
314		301	1	K157	365		301	1	K182
315	83	84	1	S9	366		301	1	K183
316		227	4	S10	367	96	97	1	S67
317		301	1	K158	368		240	4	S10
318		301	1	K159	369	_	301	1	K184
319	84	85	1	S9	370	_	301	1	K185
320		228	4	S10	371	97	98	1	S71
321		301	1	K160	372		241	4	S72
322		301	1	K161	373		301	1	K186
323	85	86	1	S9	374	_	301	1	K187
324	99	229	4	S10	375	98	99	1	S71
325		301	1	K162	376	30	242	À	S72
326		301	1	K163	377		301	1	K188
327	86	87	1	S9	378		301	1	K189
328	00	230	4	S10	379	99	100	1	S71
329		301	1	K164	380	00	243	4	S72
330		301	1	K165	381	_	301	1	K190
331	87	88	1	S9	382	_	301	1	K191
332	01	231	4	S10	383	100	101	1	S71
333		301	1	K166	384	100	244	4	S72
334		301	+	K167	385		301	1	K192
335	88	89	1	S9	386	101	102	1	S71
336	88	232	4	S10	387	101	245	4	S72
		301	1	K168	388	_	301	1	S163
337			1	K169	389	_	301	1	K193
338	89	301	+	S9	390	102	103	1	S67
	89	90	4	S10	391	102	246	4	S72
340		233	1	K170	391	_	301	1	
341		301				_			S159
342		301	1	K171	393	400	301	1	K194
343	90	91	1	S9	394	103	104	1	S9
344		234	4	S10	395		247	4	S10
345		301	1	K172	396		301	1	K195
346		301	1	K173	397		301	1	K196
347	91	92	1	S9	398	104	105	1	S9
348		235	4	S10	399		248	4	S10
349		301	1	K174	400		301	1	K197
350		301	1	K175	401		301	1	K198
351	92	93	1	S9	402	105	106	1	S9

BRANCH	NODE	TON	TAG	I, C, S	BRANCH	NODE	TON	TAG	I, C, S
403		249	4	S10	453		301	1	K224
404		301	. 1	K199	454	118	119	1	S67
405		301	1	K200	455		262	4	S10
406	106	107	1	S9	456		301	1	K225
407		250	4	S10	457		301	1	K226
408		301	1	K201	458	119	120	1	S71
409		301	1	K202	459		263	4	S72
410	107	108	1	S9	460		301	1	K227
411		251	4	S10	461		301	1	K228
412		301	1	K203	462	120	121	1	S71
413		301	1	K204	463		264	4	S72
414	108	109	1	S9	464		301	1	K229
415		252	4	S10	465		301	1	K230
416		301	1	K205	466	121	122	1	S71
417		301	1	K206	467		265	4	S72
418	109	110	1	S9	468		301	1	K231
419	. 70	253	4	S10	469		301	1	K232
420		301	1	K207	470	122	123	1	S71
421		301	1	K208	471		266	4	S72
422	110	111	1	S9	472	_	301	1	K233
423	110	254	4	S10	473	123	124	1	S71
424	_	301	1	K209	474	120	267	4.	572
425		301	1	K210	475		301	1	K234
426	111	112	1	S9	476	124	125	1	S67
427	- 111	255	4	S10	477	124	268	- 4	S72
428	-	301	1	K211	478	_	301	1	K235
429	_	301	1	K212	479	125	126	1	S9
430	112	113	1	S9	480	123	269	4	S10
430	112	256	4	S10	481	_	301	1	S10 S22
432	-	301	1	K213	482	_	301	1	
432	_	301	1	K214					K236 S9
434	113		1		483	126	127	1	
	113	114		S9	484		270	4	S10
435	-	257	4	S10	485		301	1	S26
436	-	301	1	K215	486		301	1	K237
437		301	1	K216	487	127	128	1	S9
438	114	115	1	S9	488	_	271	4	S10
439		258	4	S10	489		301	1	S30
440		301	1	K217	490		301	1	K238
441		301	1	K218	491	128	129	1	S9
442	115	116	1	S9	492		272	4	S10
443		259	4	S10	493		301	1	S34
444		301	1	K219	494		301	1	K239
445		301	1	K220	495	129	130	1	S9
446	116	117	1	S9	496		273	4	S10
447		260	4	S10	497		301	1	S38
448		301	1	K221	498		301	1	K240
449		301	1	K222	499	130	131	1	S9
450	117	118	1	S9	500		274	4	S10
451		261	4	S10	501		301	1	S42
452		301	1	K223	502		301	1	K241

BRANCH	NODE	TON	TAG	1, C, S	BRANCH	NODE	TON	TAG	1. C. S
503	131	132	1	S9	553		1011	1110	1, 0, 0
504		275	4	S10	554		_	_	_
505		301	1	S46	555		_		-
506		301	1	K242	556				
507	132	133	1	S9	557				
508		276	4	S10	558				
509		301	1	S42	559	-	_	-	
510		301	1	K243	560		_	-	
511	133	134	1	59	561	_		-	_
512		277	4	S10	562		_	-	
513	_	301	1	S38	563		-	-	
514		301	1	K244	564	_		-	_
515	134	135	1	S9	565			-	
516		278	4	S10	566	_	_	_	
517		301	1	S34	567		_		
518		301	1	K245	568				
519	135	136	1	S9	569		_		
520	100	279	4	S10	570		_		
521	_	301	1	S30	571	_		-	
522		301	1	K246	572	_	_	_	
523	136	137	1	S9	573		_		
524	100	280	4	S10	574	_			
525		301	1	S26	575	_			
526	_	301	1	K247	576	_			
527	137	138	1	\$9	577		_	,	
528	101	281	4	S10	578			-	
529	_	301	1	S22	579	_	_	_	
530	_	301	1	K248	580		_	_	
531	138	139	1	S9	581		_	_	
532	130	282	4	\$10	582	_			
			1				_		
533 534		301	1	S18 K249	583 584		_		
535	139	140	1	S9	585	_			
536	139	283	4	S10	586	_			
537	_		1	K250	587	_	_	_	
538	140	301 141	1	S7	588				
	140		4				_		
539		284		S10	589			-	
540		301	1	K251 S1	590				
541	141	142	1		591			_	
542		285	4	S2	592				
543	142	143	1	S1	593				_
544		286	4	S2	594				
545	143	144	1	S1	595				
546		287	4	S2	596				
547	144	288	4	S2	597				
548					598				
549					599				
550				-	600				
551					601				
552					602				

BRANCH		TON	TAG	1, C, S	BRANCH	NODE	TON	TAG	I. C. S.
701	145	302	5	k252	751	195	194	5	\$701
702	146	145	5	S701	752	196	195	5	S701
703	147	146	5	S701	753	197	196	5	S701
704	148	147	5	S701	754	198	197	5	S701
705	149	148	5	S701	755	199	198	5	S701
706	150	149	5	S701	756	200	199	5	S701
707	151	150	5	S701	757	201	200	5	\$701
708	152	151	5	S701	758	202	201	5	S701
709	153	152	5	S701	759	203	202	5	S701
710	154	153	5	S701	760	204	203	5	S701
711	155	154	5	S701	761	205	204	5	S701
712	156	155	5	S701	762	206	205	5	5701
713	157	156	5	S701	763	207	206	5	\$701
714	158	157	5	S701	764	208	207	5	5701
715	159	158	5	S701	765	209	208	5	S701
716	160	159	5	S701	766	210	209	5	S701
717	161	160	5	S701	767	211	210	5	S701
718	162	161	5	S701	768	212	211	5	S701
719	163	162	5	S701	769	213	212	5	S701
720	164	163	5	S701	770	214	213	5	S70*
721	165	164	5	S701	771	215	214	5	S70
722	166	165	5	S701	772	216	215	5.	\$70
723	167	166	5	S701	773	217	216	5	S70°
724	168	167	5	S701	774	218	217	5	S70
725	169	168	5	S701	775	219	218	× 5	S70
726	170	169	5	S701	776	220	219	5	S70
727	171	170	5	\$701	777	221	220	5	S70
728	172	171	5	S701	778	222	221	5	S70
729	173	172	5	S701	779	223	222	5	\$70
730	174	173	5	S701	780	224	223	5	S70
731	175	174	5	\$701	781	224	223	5	S70
732	176	175	5	S701			225	5	
733	177				782	226			S701
734		176	5	S701	783	227	226	5	S701
735	178	177	5	S701	784	228	227	5	S70
736	179	179	5	S701	785	229	228	5	S70
		1/9	5	S701	786	230	229	5	S70
737 738	181	180	5	S701	787	231	230	5	S70
739	182	181	5	S701	788	232	231	5	S70
740	183	182		S701	789	233	232	5	S70
740	184	183	5	S701	790	234	233	5	S70
742	185	184	5	\$701	791				S70
743	186	185		S701	792	236	235	5	S70
744	187	186	5	S701	793	237	236	5 .	S70
744	188	187		S701	794	238	237		S70
	189	188	5	S701	795	239	238	5	S70
746	190	189	5	S701	796	240	239	5	S70
747	191	190	5	S701	797	241	240	5	S70
748	192	191	5	S701	798	242	241	5	S70
749	193	192	5	S701	799	243	242	5	S70
750	194	193	5	S701	800	244	243	5	S70

	NODE	TON	TAG	1, C. S	BRANCH	NODE	TON	TAG	I. C. S
801	245	244	5	S701	851				
802	246	245	5	S701	852		-		
803	247	246	5	\$701	853				-
804	248	247	5	S701	854				
805	249	248	5	S701	855				
806	250	249	5	S701	856				
807	251	250	5	\$701	857				
808	252	251	5	S701	858				
809	253	252	5	S701	859				_
810	254	253	5	S701	860				_
811	255	254	5	S701	861		_		_
812	256	255	5	S701	862			-	_
813	257	256	5	S701	863				_
814	258	257	5	S701	864	_			
815	259	258	5	S701	865		_		
816	260	259	5	S701	866		_		
817	261	260	5	S701	867	_	_	_	
818	262	261	5	S701	868		_	_	_
819	263	262	5	S701	869	_		_	
820	264	263	5	S701	870		_	_	_
821	265	264	5	S701	871		_		_
822	266	265	5	S701	872	_	_	_	
823	267	266	5	S701	873	-	_	-	
824	268	267	5	S701	874	_	_		
825	269	268	5	S701	875	_	_	,	
826	270	269	5	S701	876			-	
827	271	270	5	S701	877	_		_	
828	272	271	5	S701	878	-			
829	273	272	5	S701	879	_		_	
830	274	273	5	S701	880	_		_	
831	275	274	5	S701	881		_	_	
832	276	275	5	S701	882		_		_
833	277	276	5	S701	883		_	_	
			5		884		_	-	
834	278	277	5	S701			_	-	
835	279	278	5	S701	885				
836	280	279		S701	886 887				
837	281	280	5	S701		_	_		
838	282	281	5	S701	888 889				
839	283	282	2	S701				-	_
840	284	283	5	\$701	890				
841	285	284		S701					
842	286	285	5	S701	892				
843	287	286	5	\$701	893				
844	288	287	5	S701	894				
845					895				
846					896				
847					897				
848					898				
849					899				
850					900				

****	DD DE GITOS		,	Junior	. 7		11/40	ig.	O.	watts	1	Liay	-	10
Brnh	From To	Tac	Conduct	Brnh	Fr	om To	Tac	Condu	etl	Brnh	Pri	om To	Tac	Conduct
1	1 2	1	.178E+01	57	17	301		.860E-		113		176	4	.701E+00
2	1 145	4	.576E+00	58	17	301	î	.910E-		114		301	1	.860E-01
3	2 3	1	.178E+01	59	18	19	î	.146E+		115	32	301	î	.830E-01
4	2 146	4	.576E+00	60	18	162	4	.701E+		116	33	34	1	.146E+01
5	3 4	i	.178E+01	61	18	301	ī	.860E-		117	33	177	á	.701E+00
6	3 147	4	.576E+00	62	18	301	î	.820E-		118		301	ĩ	.860E-01
7	4 5	1	.160E+01	63	19	20	î	.146E+		119	33	301	÷	.830E-01
8	4 148	ã	.576E+00	64	19	163	ā	.701E+		120	34	35	î	
9	5 6	ī	.146E+01	65	19	301	ī	.870E-		121		178	4	.146E+01
10	5 149	4	.701E+00	66	19	301		.680E-		122		301	1	.860E-01
11	5 301	1	.954E-01	67	20	21	î	.129E+		123	34	301	î	.830E-01
12	6 7	ī	.146E+01	68	20	164	4	.701E+		124	35	36	1	.146E+01
13	6 150	4	.701E+00	69	20	301	1	.870E-		125		179	4	.701E+00
14	6 301	i	.940E-01	70	20	301	î	.490E-		126	35	301	ï	.860E-01
15	7 8	ī	.146E+01	71	21	22	î	.115E+		127	35	301	î	.820E-01
16	7 151	4	.701E+00	72	21	165	4	.889E+		128	36	37	î	.146E+01
17	7 301	i	.920E-01	73	21	301	ī	.940E-		129		180	4	.701E+00
18	7 301	1	.240E-01	74	22	23	î	.115E+		130	36	301	1	.860E-01
19	8 9	î	.146E+01	75	22	166	â	.889E+		131	36	301	î	.810E-01
20	8 152	ã	.701E+00	76	22	301	1	.770E-		132	37	38	î	.146E+01
21	8 301	1	.910E-01	77	23	24				133	37	181	4	.701E+00
22	8 301	1	.490E-01	78	23	167	4	.889E+		134	37	301	ī	.850E-01
23	9 10	ī	.146E+01	79	23	301	1	.420E-		135	37	301	î	.800E-01
24	9 153	4	.701E+00	80	24	25	î	.115E+		136	38	39	î	.146E+01
25	9 301	1	.890E-01	81	24	168	4	.889E+		137		182	4	.701E+00
26	9 301	1	.680E-01	82	24	301	1	.136E+		138	38	301	ī	.850E-01
27	10 11	1	.146E+01	83	24	301	î	.220E-		139	38	301	î	.780E-01
28	10 154	4	.701E+00	84	25	26	1	.115E+		140	39	40	î	.146E+01
29	10 301	1	.880E-01	85	25	169	4	.889E+		141		183	4	.701E+00
30	10 301	1	.820E-01	86	25	301	- î	.117E+		142	39	301	ī	.850E-01
31	11 12	1	.146E+01	87	25	301	1	.640E-		143		301	î	.770E-01
32	11 155.	4	.701E+00	88	26	27	1	.129E+		144	40	41	ī	.146E+01
33	11 301 -	- 1	.870E-01	89	26	170	4	.889E+		145		184	4	.701E+00
34	11 301	1	.910E-01	90	26	301	1	.101E+		146	40	301	i	.850E-01
35	12 13	1	.146E+01	91	26	301	1	.850E-		147		301	ī	.750E-01
36	12 156	4	.701E+00	92	27	28	1	.146E+	-01	148	41	42	1	.146E+01
37	12 301	1	.860E-01	93	27	171	4	.701E+		149		185	4	.701E+00
38	12 301	1	.970E-01	94	27	301	1	.890E-	-01	150	41	301	1	.850E-01
39	13 14	1	.146E+01	95	27	301	1	.810E-	-01	151	41	301	ī	.730E-01
40	13 157	4	.701E+00	96	28	29	1	.146E+	01	152	42	43	1	.129E+01
41	13 301	1	.850E-01	97	28	172	4	.701E+	00	153	42	186	4	.701E+00
42	13 301	1	.100E+00	98	28	301	1	.880E-	-01	154	42	301	1	.850E-01
43	14 15	1	.146E+01	99	28	301	1	.810E-	-01	155	42	301	1	.710E-01
44	14 158	4	.701E+00	100	29	30	1	.146E+	-01	156	43	44	1	.115E+01
45	14 301	1	.850E-01	101	29	173	4	.701E+	-00	157	43	187	4	.889E+00
46	14 301	1	.101E+00	102	29	301	1	.870E-	-01	158	43	301	1	.910E-01
47	15 16	1	.146E+01	103	29	301	1	.820E-	-01	159	43	301	1	.124E+00
48	15 159	4	.701E+00	104	30	31	1	.146E+	-01	160	44	45	1	.115E+01
49	15 301	1	.850E-01	105	30	174	4	.701E+	-00	161	44	188	4	.889E+00
50	15 301	1	.100E+00	106	30	301	1	.870E-	-01	162	44	301	1	.730E-01
51	16 17	1	.146E+01	107	30	301	1	.830E-	-01	163	44	301	1	.920E-01
52	16 160	4	.701E+00	108	31	32	1	.146E+	-01	164	45	46	1	.115E+01
53	16 301	1	.850E-01	109	31	175	4	.701E+		165		189	4	.889E+00
54	16 301	1	.970E-01	110	31	301	1	.870E-		166		301	1	.390E-01
55	17 18	1	.146E+01	111	31	301	1	.830E-	-01	167	46	47	1	.115E+01
56	17 161	4	.701E+00	112	32	- 33	1	.146E+		168		190		.889E+00

Brnh	From To	Tag	Conduct	Brnh	Fr	on To	Tag	Conduct	Brnh	Fri	on To	Tac	Conduc
169	46 301		150E+00	225	60	301		.860E-01	281	74	301	1	.138E+0
170	46 301		250E-01	226	60	301	1	.810E-01	282	74	301	1	.700E-0
171	47 48		115E+01	227	61	62	î	.146E+01	283	75	76	1	
172	47 191		889E+00	228	61	205	4	.701E+00	284	75			.120E+0
173	47 301		127E+00	229	61	301	i	.860E-01			219	4	.889E+0
174	47 301		690E-01		61	301			285	75	301	1	.157E+0
175				230	62		1	.810E-01	286	75	301	1	.900E-0
	48 49		129E+01	231		63	1	.146E+01	287	76	77	1	.125E+0
176	48 192		889E+00	232	62	206	4	.701E+00	288	76	220	4	.655E+0
177	48 301		100E+00	233	62	301	1	.860E-01	289	76	301	1	-171E+0
178	48 301		890E-01	234	62	301	1	.810E-01	290	76	301	1	.980E-0
179	49 50		146E+01	235	63	64	1	.146E+01	291	77	78	1	.210E+0
180	49 193	4 .	701E+00	236	63	207	4	.701E+00	292	77	221	4	.655E+0
181	49 301	1 .	880E-01	237	63	301	1	.860E-01	293	77	301	1	.172E+0
182	49 301	1 .	830E-01	238	63	301	1	.800E-01	294	77	301	1	.970E-0
183	50 51	1 .	146E+01	239	64	65	1	.108E+01	295	78	79	î	.172E+0
184	50 194	4 .	701E+00	240	64	208	4	.701E+00	296	78	222	4	.542E+0
185	50 301		870E-01	241	64	301	1	.860E-01	297	78	301	1	.124E+0
186	50 301		830E-01	242	64	301	ī	.790E-01	298	78	301	i	.910E-0
187	51 52		146E+01	243	65	66	î	.992E+00	299	79	80	î	
188	51 195		701E+00	244	65	209	4	.990E+00	300	79		4	.992E+0
189	51 301		870E-01	245	65	301	ì	.940E-01		79	223		.815E+0
									301		301	1	.108E+0
190			830E-01	246	65	301	1	.870E-01	302	79	301	1	.870E-0
191	52 53		146E+01	247	66	67		.172E+01	303	80	81	1	.108E+03
192	52 196		701E+00	248	66	210	4	.815E+00	304	80	224	4	.990E+00
193	52 301		870E-01	249	66	301		.930E-01	305	80	301	1	.930E-03
194	52 301		830E-01	250	66	301	1	.103E+00	306	80	301	1	.910E-03
195	53 54		146E+01	251	67	68	1	.210E+01	307	81	82	1	.146E+03
196	53 197		701E+00	252	67	211	4	.542E+00	308	81	225	4	.701E+00
197	53 301		870E-01	253	67	301	1	.930E-01	309	81	301	1	.840E-0
198	53 301	1 .	830E-01	254	67	301	1	.125E+00	310	81	301	1	.830E-03
199	54 55	1 .	146E+01	255	68	69	1	.125E+01	311	82	83	1	.146E+0
200	54 198	4 .	701E+00	256	68	212	4	.655E+00	312	82	226	4	.701E+00
201	54 301	1 .	870E-01	257	68	301	1	.990E-01	313	82	301	ī	.850E-0
202	54 301		830E-01	258	68	301	ī	.172E+00	314	82	301	î	.820E-01
203	55 56		146E+01	259	69	70	î	.120E+01	315	83	84	î	.146E+0
204	55 199		701E+00	260	69	213	â	.655E+00	316	83	227	4	.701E+00
205	55 301		870E-01	261	69	301		.990E-01	317	83			
205	55 301		830E-01	262	69	301	1	.171E+00		83	301	1	.850E-0
206	56 57		146E+01		70	71		.1/1E+00	318		301	1	.820E-0
207			701E+00	263			1		319	84	85	1	.146E+0
				264	70	214		.889E+00	320	84	228	4	.701E+0
209	56 301		870E-01	265	70	301	1	.900E-01	321	84	301	1	.860E-0
210	56 301		820E-01	266	70	301	1	.157E+00	322	84	301	1	.820E-0
211	57 58		146E+01	267	71	72	1	.115E+01	323	85	86	1	.146E+0
212	57 201		701E+00	268	71	215	4	.889E+00	324	85	229	4	.701E+0
213	57 301		860E-01	269	71	301	1	.710E-01	325	85	301	1	.860E-0
214	57 301	1 .	820E-01	270	71	301	1	.138E+00	326	85	301	1	.820E-0
215	58 59	1 .	146E+01	271	72	73	1	.115E+01	327	86	87	1	.146E+0
216	58 202		701E+00	272	72	216		.889E+00	328	86	230	4	.701E+0
217	58 301		860E-01	273	72	301	1	.330E-01	329	86	301	1	.860E-0
218	58 301		820E-01	274	72	301	i	.670E-01	330	86	301	1	.820E-0
219	59 60		146E+01	275	73	74	1	.115E+01	331	87	88	1	
220	59 203		701E+00	276	73	217		.889E+00	332	87	231	4	.146E+0
221	59 301		860E-01	277	73	301	1						.701E+0
								.670E-01	333	87	301	1	.860E-0
222	59 301		820E-01	278	73	301	1	.310E-01	334	87	301	1	.820E-0
223	60 61		146E+01	279	74	75	1	.115E+01	335	88	89	1	.146E+0
224	60 204	4 .	.701E+00	280	74	218	4	.889E+00	336	88	232	4	.701E+0

				Conduct					g Conduct	Brn	h Fr	on To	Ta	Conduct
337	88 30:			.850E-01		102		1	.900E-01	449	116	301	1	.830E-01
338	88 30:		1	.820E-01	394	103	104	1	.146E+01	450	117	118	1	.146E+01
339	89 90		1	.146E+01	395	103	247	4	.701E+00	451	117	261	4	.701E+00
340	89 23:	3	4	.701E+00	396	103	301	1	.760E-01	452	117	301	1	.830E-01
341	89 303		1	.850E-01	397	103	301	1	.840E-01		117		î	.830E-01
342	89 30:		1	.810E-01	398		105	ī	.146E+01		118		î	.129E+01
343	90 9		1	.146E+01		104		â	.701E+00		118		4	.701E+00
344	90 234		ã	.701E+00		104		ī	.780E-01		118		1	
345	90 30		i	.850E-01		104		1	.840E-01		118		1	.820E-01
346	90 30		î	.810E-01		105		1	.146E+01					.840E-01
347	91 9		î	.146E+01		105					119		1	.115E+01
348	91 235		4	.701E+00				4	.701E+00		119		4	.889E+00
349	91 30					105		1	.790E-01		119		1	.860E-01
			1	.850E-01		105		1	.830E-01		119		1	.960E-01
350	91 30:		1	.810E-01		106		1	.146E+01		120		1	.115E+01
351	92 9:		1	.146E+01		106		4	.701E+00		120	264	4	.889E+00
352	92 236		4	.701E+00		106		1	.810E-01	464	120	301	1	.650E-01
353	92 30			.850E-01		106		1	.830E-01	465	120	301	1	.113E+00
354	92 30:		1	.810E-01	410	107	108	1	.146E+01	466	121	122	1	.115E+01
355	93 94		1	.146E+01	411	107	251	4	.701E+00	467	121	265	4	.889E+00
356	93 237	,	4	.701E+00	412	107	301	1	.820E-01	468	121	301	1	.220E-01
357	93 301		1	.850E-01	413	107	301	1	.830E-01		121	301	î	.133E+00
358	93 301		1	.810E-01		108		ī	.146E+01		122	123	1	-115E+01
359	94 95		ī	.146E+01		108		4	.701E+00		122	266	â	.889E+00
360	94 238		4	.701E+00		108		i	.840E-01		122	301	ī	.420E-01
361	94 301		ĩ	.850E-01		108		1	.830E-01	473	123	124	1	
362	94 30		î	.810E-01		109		1	.146E+01		123		1	.115E+01
363	95 96		î	.146E+01		109		â				267		.889E+00
364	95 239		4	.701E+00		109		1	.701E+00		123	301	1	.760E-01
365	95 30		î					1	.850E-01		124		1	.129E+01
				.850E-01		109			.830E-01	477		268	4	.889E+00
366	95 301		1	.810E-01		110		1	.146E+01		124	301	1	.940E-01
367	96 97		1	.129E+01		110		4	.701E+00		125	126	1	.146E+01
368	96 240		4	.701E+00		110		1	.850E-01		125	269		.701E+00
369	96 303		1	.840E-01		110		1	.830E-01		125	301	1	.490E-01
370	96 303		1	.800E-01		111		1	.146E+01		125	301	1	.860E-01
371	97 98		1	.115E+01	427	111	255	4	.701E+00	483	126	127	1	.146E+01
372	97 243		4	.889E+00	428	111	301	1	.850E-01	484	126	270	4	.701E+00
373	97 30		1	.900E-01	429	111	301	1	.830E-01	485	126	301	1	.680E-01
374	97 303	1	1	.930E-01	430	112	113	1	.146E+01	486	126	301	1	.860E-01
375	98 99	•	1	.115E+01	431	112	256	4	.701E+00	487	127	128	1	.146E+01
376	98 24:	2	4	.889E+00	432	112	301	1	.850E-01	488	127	271	4	.701E+00
377	98 30	i i	1	.690E-01	433	112	301	1	.830E-01		127	301	1	.820E-01
378	98 30		1	.123E+00		113		1	.146E+01		127	301	1	.850E-01
379	99 100		î	.115E+01		113		4	.701E+00		128	129	î	.146E+01
380	99 24		4	.889E+00		113		ī	.850E-01		128	272		.701E+00
381	99 30		ī	.260E-01		113		1	.830E-01		128	301	1	.910E-01
382	99 30		î	.149E+00		114		1	.146E+01		128	301	1	.840E-01
	100 10							4					1	
			1	.115E+01		114			.701E+00		129	130		.146E+01
	100 244		4	.889E+00		114		1	.850E-01		129		4	.701E+00
	100 30		1	.380E-01		114		1	.830E-01		129	301	1	.970E-01
	101 103		1	.115E+01		115		1	.146E+01		129		1	.830E-01
	101 249		4	.889E+00		115		4	.701E+00		130		1	.146E+01
	101 30		1	.920E-01		115		1	.840E-01		130		4	.701E+00
	101 303		1	.720E-01	445	115	301	1	.830E-01	501	130	301	1	.100E+00
390	102 103	3	1	.129E+01	446	116	117	1	.146E+01	502	130	301	1	.830E-01
391	102 246	5	4	.889E+00	447	116	260	4	.701E+00	503	131	132	1	.146E+01
392	102 30	1	1	.124E+00	448	116		1	.840E-01		131	275	4	.701E+00
			-					_				-		

Brnh From To	Tag Conducti	Brnh From To	Tag Conduct I	Bank France Fra	
505 131 301	1 -101E+00	561 158 157	5 .174E+03	Brnh From To 617 214 213	5 .174E+03
506 131 301	1 .830E-01	562 159 158	5 .174E+03	618 215 214	5 .174E+03
507 132 133	1 .146E+01	563 160 159	5 .174E+03	619 216 215	5 .174E+03
508 132 276	4 .701E+00	564 161 160	5 .174E+03	620 217 216	5 .174E+03
509 132 301	1 .100E+00	565 162 161	5 -174E+03	621 218 217	5 .174E+03
510 132 301	1 .830E-01	566 163 162	5 .174E+03	622 219 218	5 .174E+03
511 133 134	1 .146E+01	567 164 163	5 .174E+03	623 220 219	5 .174E+03
512 133 277	4 .701E+00	568 165 164	5 .174E+03	624 221 220	5 .174E+03
513 133 301	1 .970E-01	569 166 165	5 .174E+03	625 222 221	5 .174E+03
514 133 301	1 .830E-01	570 167 166	5 .174E+03	626 223 222	5 .174E+03
515 134 135	1 .146E+01	571 168 167	5 -174E+03	627 224 223	5 .174E+03
516 134 278	4 .701E+00	572 169 168	5 .174E+03	628 225 224	5 .174E+03
517 134 301	1 .910E-01	573 170 169	5 .174E+03	629 226 225	5 .174E+03
518 134 301	1 .840E-01	574 171 170	5 .174E+03	630 227 226	5 .174E+03
519 135 136	1 .146E+01	575 172 171	5 .174E+03	631 228 227	5 .174E+03
520 135 279	4 .701E+00	576 173 172	5 .174E+03	632 229 228	5 .174E+03
521 135 301	1 .820E-01	577 174 173	5 .174E+03	633 230 229	5 .174E+03
522 135 301	1 .840E-01	578 175 174	5 .174E+03	634 231 230	5 .174E+03
523 136 137	1 .146E+01	579 176 175	5 .174E+03	635 232 231	5 .174E+03
524 136 280	4 .701E+00	580 177 176	5 .174E+03	636 233 232	5 .174E+03
525 136 301	1 .680E-01	581 178 177	5 .174E+03	637 234 233	5 .174E+03
526 136 301	1 .860E-01	582 179 178	5 .174E+03	638 235 234	5 .174E+03
527 137 138	1 .146E+01	583 180 179	5 .174E+03	639 236 235	5 .174E+03
528 137 281	4 .701E+00	584 181 180	5 .174E+03	640 237 236	5 .174E+03
529 137 301	1 .490E-01	585 182 181	5 .174E+03	641 238 237	5 .174E+03
530 137 301	1 .870E-01	586 183 182	5 .174E+03	642 239 238	5 .174E+03
531 138 139	1 .146E+01	587 184 183	5 .174E+03	643 240 239	5 .174E+03
532 138 282	4 .701E+00	588 185 184	5 .174E+03	644 241 240	5 .174E+03
533 138 301	1 .240E-01	589 186 185	5 .174E+03	645 242 241	5 .174E+03
534 138 301	1 .880E-01	590 187 186	5 .174E+03	646 243 242	5 .174E+03
535 139 140	1 .146E+01	591 188 187	5 .174E+03	647 244 243	5 .174E+03
536 139 283	4 .701E+00	592 189 188	5 .174E+03	648 245 244	5 .174E+03
537 139 301	1 .900E-01	593 190 189	5 .174E+03	649 246 245	5 .174E+03
538 140 141	1 .160E+01	594 191 190	5 .174E+03	650 247 246	5 .174E+03
539 140 284	4 .701E+00	595 192 191	5 .174E+03	651 248 247	5 .174E+03
540 140 301	1 .910E-01	596 193 192	5 .174E+03	652 249 248	5 .174E+03
541 141 142	1 .178E+01	597 194 193	5 .174E+03	653 250 249	5 .174E+03
542 141 285	4 .576E+00	598 195 194	5 .174E+03	654 251 250	5 .174E+03
543 142 143	1 .178E+01	599 196 195	5 .174E+03	655 252 251	5 .174E+03
544 142 286	4 .576E+00	600 197 196	5 .174E+03	656 253 252	5 .174E+03
545 143 144	1 .178E+01	601 198 197	5 .174E+03	657 254 253	5 .174E+03
546 143 287	4 .576E+00	602 199 198	5 .174E+03	658 255 254	5 .174E+03
547 144 288	4 .576E+00	603 200 199	5 .174E+03	659 256 255	5 .174E+03
548 145 302	5 .174E+03	604 201 200	5 .174E+03	660 257 256	5 .174E+03
549 146 145	5 .174E+03	605 202 201	5 .174E+03	661 258 257	5 .174E+03
550 147 146	5 .174E+03	606 203 202	5 .174E+03	662 259 258	5 .174E+03
551 148 147	5 .174E+03	607 204 203	5 .174E+03	663 260 259	5 .174E+03
552 149 148	5 .174E+03	608 205 204	5 .174E+03	664 261 260	5 .174E+03
553 150 149	5 .174E+03	609 206 205	5 .174E+03	665 262 261	5 .174E+03
554 151 150	5 .174E+03	610 207 206	5 .174E+03	666 263 262	5 .174E+03
555 152 151	5 .174E+03	611 208 207	5 .174E+03	667 264 263	5 .174E+03
556 153 152	5 .174E+03	612 209 208	5 .174E+03	668 265 264	5 .174E+03
557 154 153	5 .174E+03	613 210 209	5 .174E+03	669 266 265	5 .174E+03
558 155 154	5 .174E+03	614 211 210	5 .174E+03	670 267 266	5 .174E+03
559 156 155	5 .174E+03	615 212 211	5 .174E+03	671 268 267	5 .174E+03
560 157 156	5 .174E+03	616 213 212	5 -174E+03	672 269 268	5 .174E+03
5, 150					

.

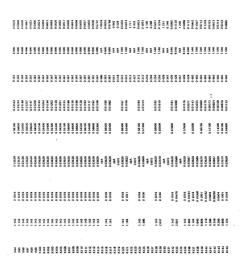
D		m	
	From To		
673 2	70 269		74E+03
674 2			74E+03
675 2	72 271	5 .1	74E+03
676 2	73 272	5 .1	74E+03
	74 273		74E+03
678 2	75 274	5 .1	74E+03
679 2	76 275		74E+03
680 2	77 276		74E+03
681 2	78 277	5 .1	74E+03
682 2	79 278	5 .1	74E+03
683 2			74E+03
684 2	81 280		74E+03
685 2	82 281		74E+03
686 2	83 282		74E+03
687 2	84 283	5 .1	74E+03
	85 284		74E+03
689 2	86 285		74E+03
690 2	87 286		74E+03
691 2	88 287	5 .1	74E+03

TASS GENERAL INPUT MENU - SI Units

(1) Case Title: TALSR(METRIC):---RUN 3. COMPLEX MODEL, MASS FLOW OF 68 kg/hr (150 lbm/hr) (288 (2) Nodes (3) Constant Temperatures (4) Unique Exponents 0 (5) Temperature Dependent Conductances (6) Temperature Dependent Heat Inputs 0 (7) Computational Accuracy (8) Starting Temperature 25.0 Are these inputs correct (Y/N) ? Y

	2	_	-																																							
	2 4 4	10.00		N. Value	(MEM)	1 2784	0.00	1 6043	1 4612	03730	90000	00000	0 000	0 0541	0000	0000	0.0062	0.0070	0.000	0.000	0.00		0 0000	0.1000	0.0850	0.163	0.0850	00000	00000	0 0000	1 2907	0.0973	201	0.4728	0.0944	00770	000	0.1335	0 0218	0.1171	0.0042	0.401.0
-	Brest pipe Garrete	0.463		Finaliteds		400	VIII.	Vii	MA	MA	0.000	0.000	0.000	0.000	0 1	0.60	0 860	0.000	0.000	0.000	6.860	200	200	0 000	000 0	0.000	0000	200		0 000	**	6.600	¥2	4.87	7.540	7.540	7.540	7 540	2,540	2.540	2.540	2 540
	Outer pipe distribut	0000		Dist. Debreson Hodes	(res) .	0.00	0.00	0334	0.347	0.367	0.367	0.367	0 367	0 367	200	200	0.367	0.367	0 367	0.367	0.367		780	1900	/第0	0.367	0.367	2 3	-	190	0.416	0.367	0.465	0.460	0.465	0.466	0.465	0.465	994-0	0 465	0 460	0.466
	a Praesti Number	0.707		Yes	(148.00)						0.01333	910100	0.01261	0 00582	907100	0.01245	0.00637	0.01226	001130	0.01210	0.01271		001100	0.01400	0.01104	0.01419	0.01164	0000		00100		0.01216			001100	0.00066	00000	001745	0.00231	0.01501	0.00796	400.000
	Popucada Numbe	1800 00		t Jess	(cm)						0.68200	0.60000	0.66200	*******	00000	001290		0.0000		0.56600		2	0.58400		0.54160		001890	0399100	90000	0.54600		0.60200			0.96000	0 44800	0.20300	1.10100	0.05000	0 62200	0.36600	0.644.00
	Prestate Conductivity of Copper (pRoymobile Number Prestal Number	(Mices 45)	Occasional designation of the last of the	Heat Transfer Coefficers (b)	(Whepon K)	***	0.670	100	100	0.70	0.03626	0.03628	0.03626	004740	2000	000000	0.000	0.03626	99.400.0	9.09000	91/090	929000	0.03626	0 63660	0.03626	0.03696	0.03626	929600	10700	0.03636	**	0.03620	444	0.420	0.00620	0.03670	0.03526	875000	0.03928	009000	0.00000	0.00000
	8	00033		Elective Durmater	(un)						0.101.0	0.101.0	01010	0.0001	1010	0.101.0	50000	0 1010	0.0000	0.101.0	0.0962	2000	01010	0.0963	01010	0.0904	01010	01010	9	91010		0.1010			0.1010	0.1001	0.0004	0.1040	0.000	0.000	0.1001	4.631
	Fin Dackoose	(cm)	-	Charcost Whith (Id. Ellactive Durman	(tree)						911	1.163	2	300	200	2	9190	911	169.0	3	0.626		1143	9170	1143	0.732	91	2 :		2		1.143			1 104	9000	0.266	2037	0.266	1.486	9090	****
NPUT DATA	Figure (A)	(cm)		K-Vakon		×	2	! 2	×	2	92	Z	2	2 ;	2	25	K13	K14	K15	9 1	Š		979	2	223	2	ž	2 5	100	2	829	600	ž	K32	2	ž	25	200	ć.	2	902	246

X4.	21.	2010	97.96.0 0	0.0100	001241	176.0	0 000	9000
2	211	91010	977500	0.04100	001110	0.307	0000	0.000
244	911	01010	970000	0.01000	0.012281	175.0	2000	10000
242	211	21010	979000	00/100	921100	1950	0.000	0,0013
246	1.10	2122 0	979100	0 00300	017100	100.0	0000	0.0014
N.C.	91	21010	977500	0.0000	Gerran	1950	9000	0.000
2.40	9 .	71010	92909.0	n priedo	017100	1900	004 9	0.0000
7.18	2	01010	0.0000	0 03000	*****	700.0	0000	9799 0
3.4	911	21010	97979	0 69000	001100	120	0000	00000
KSI	2	21010	003050	0.00210	541100	127	0 000	d to the big
25	3	21010	979000	0.00000	0.01201	78.0	0 000	2000.0
32	91.	22.0	900090	0.000.00	211100	7000	0 000	0.000
Y.	?	2000	000000	0 00000	001100	/00.0	2000	00000
N.50	21.	2110	970000	0.000.00	241100	700 0	0 000	00000
276	2	2220	000000	0 100000	91100	78.0	2000	20000
437	2	91919	97900 0	O SPACE	91100	707.0	2000	97000
2.5	2	2220	970000	0.0000.0	201100	700.0	0000	90000
K16	97.	01010	900000	061340	001130	79.0	0 000	2790.0
200	2	21010	977500	000000	001100	755.0	0 000	50000
- 92	?	01010	900000	0.04560	921190	77.0	0000	01000
N.	21.	0.101.0	900000	0 58400	911100	756.0	2000	40000
202	911	21010	979590	000000	001100	796.0	0000	0.07.00
7	27.	01010	97950	0.000.00	001100	797.0	0 100	70000
6463	2	61010	979090	002200	Course	795.0	0 000	10797
KIG	2	91010	0.00000	201000	101100	790 0	0000	0,000
MA.	2:-	01010	979500	0 66000	0.01003	795.0	0000	60700
994	911	01010	959590	U GOLCO	001162	700.0	0000	****
PL60	2	6.101.0	929000	20100	******	795.0	0000	22.00
200	2	01010	0.00000	0.5/000	201100	6 363	0000	71000
2		91010	9.000.0	0 47 100	0.01000	795.0	0 000	07700
K12	2	01010	900000	0.07600	971100	200.0	0000	17000
6/3	91	61019	0.03626	0.46140	O CASSON O	795.0	2000	1170'0
K/4	- 10	01010	0.0000	0.054443	931100	0.405	2 140	loud o
	999 0	9011.0	759100		001101	900 0	240	01210
276	9000	1310	0.0367.0	04160	118000	999 0	7.540	97700
13	9900	0.000	0.00741		791100	0 645	2 540	17400
2/6	920	*****	97850	0 18540	0000100	500 0	014	60700
97	2431	2741.0	000000	1 40040	001102	999 0	247	20110
250	957.0	1000	97550	91110	977000	949 0	2 540	10700
ž	900	0 1637	100000	0.0000	0.01625	0.465	27.0	0.1700
294	0.00	1001 0	0.000	O SHOKED	0.00057	900 0	244	10000
9	1 275	2201 0	919000	0 041440	0012/0	504.0	7.040	0 1001
101	1.104	0.1010	0.00020	0.04500	721100	994-0	740	9999
KBS	21.1	61010	979000	00000	00230	795.0	0000	6 007.0
Kee	2	21010	0.03426	0.00000	001110	/00.0	0 000	0.0003
3	2:	0.101.0	0.63626	0 60 300	0017100	195.0	0000	1,000
K60	917	21010	0.00026	0.00000	911100	175.0	0000	27000
102	21.0	91010	979000	017010	917100	1000	0.000	Cont
32	210	21010	979090	01000	0.01116.1	795.0	0 000	60000
ź	2	61010	0.0000	0 00000	001513	177.0	0000	0.007.0
3	2	91919	970700	0.705.0	601100	100.0	0000	0.0000
32	2	2000	979000	U LAMOO	0.01212	o sol	000	0/000



3	5/60	21242	1180	1001	prene	3	â	0.0042	0 0025	0.0046	P. Co.24	25000	6,0023	0.0635	17900	0.0055	0.0000	0.0055	21990	0.6055	91990	D 0654	2	9699	1100	0000	61907	0632	0190	0650	9909	200	9000	2	9000	0.0045	0.0000	1		0.0000	8	1000	2 5	1	1 5		9	3	2	
0.000	0	0	5	20	9	0	0.060.0	3	3	30	30	3	9	30	3 9	30	3	3 3	3	3.0	0.0	3	0.0015	3	3	9	6.0	3	3	3	3	3	3	99900	3	8	0	0.004	0.000	5	00000	5 -	07100	9446	2000	0.022	70000	0000	90000	
404	9000	25.2	2 540	2640	0707	25.0	2.540	9	9 900	0 000	0.000	0.000	9	6.880	6.000	0.000	0000 0	6.000	9	900 9	9 990	0000	6.050	0.000	0000	000 9	0.000	9 000	0.000	0.000	200	0.000	0.000	0 000	0000	0 000	0 000	0000	0 000	240	200	1	40	3	3	7 600	1 56	0000	0 000	
200	0.629	0 705	\$52.0	0.312	0.312	0 641	0 541	0.367	190.0	6K 0	190.0	197.0	0.367	0 387	296.0	0 347	/90.0	0 367	0 307	0 387	196 0	0 367	0.367	0.367	0.367	190.0	0.367	0.362	0.362	0.367	0.367	0.367	295 0	196.0	0.367	0.367	196.0	0 367	0 367	0 403	0 463	0 400	0 400	990	5000	0 466	0 465	190.0	0 367	
90100	001157	CH0100	0 01155	0.01376	001100	001104	001100	. 1/1100	001147	181100	001145	0.01105	991100	001100	0.01140	001100	001139	001100	901138	201100	001134	001100	001132	0.01166	001130	0.01107	0.01120	991100	001120	90.00	9,01124	0.01162	001122	21100	001110	971100	411100	001174	9	91100	001100	100000	775100	00000	0000	0.00000	901130	0.01056	001163	
0.000	0.56400	0.97600	0.56300	00170	0.56200	0.00000	0.0000	0.67300	0.0000	0057500	0.557.00	0.56230	0.0000	0.50500	0.55400	0.56500	0.50300	0.16560	0.05100	0.00000	0.05000	0.16400	004040	004930	0.54000	0.16300	0.54700	0.54200	0.54900	0.56100	0.64430	0.16000	0.54300	0.57700	0.54100	0.67600	0.04000	0057300	0.00000	0.00000	0.56000	00000	00000	0000	0.000	0.41300	0.65100	0.50400	0 36600	
10,000	929000	0.03578	90000	0 03000	900000	0 03622	0.03626	929000	0.03626	900000	900000	929000	900000	900000	0.00026	900000	0.03436	92909 0	909000	979000	0.00026	900000	0.00626	979000	90000	900000	0.00026	979000	0.03636	979000	0.00026	909000	979000	979000	979000	0.03626	900000	959000	979070	0.03629	910000	0.0000	10000	0.0000	40000	0.0000	0.03629	909600	0.03626	
0.010	01010	0.1040	01010	0.1030	01010	0 1021	0.000	01010	0.0010	0 1010	61010	61010	0.1019	0.1019	0.1019	0.1010	61010	91010	0.101.0	0.101.0	61010	61010	61010	6.101.0	61010	61010	0.101.0	0.101.0	01010	61010	0.1010	61010	0.1019	0.1019	01010	0.1019	0.1019	01010		0.1018	0 1022	1010	0.000	0.0040	0 000 0	0.1501	0.1016	01010	0.101.0	
911	91	2033	1163	1 496	1.143	- 14	91.	1143	1143	21.1	21.1	1.143	21.1	21.1	21.1	21.	21.1	31.1	21.1	1.16	21.1	21.1	21.1	21.	21.1	21.1	21.1	21.1	21.1	21.1	911	2	21.1	911	116	917	21.	2.	2	104	1 228	0.000	200	200	900.0	0.00	1 104	911	211	
9719	K147	K148	K149	X150	KISI	313	X163	X164	8 I S	81X	K167	×155	×150	×160	K161	KIEZ	313	¥164	K166	K166	Kier	×166	×160	K170	K171	K172	K173	K174	K176	K176	K12	K176	K170	9	191	K162	3	1	A 160	×100	200	2 1				W. 183	× in	×195	×156	

K198	1143	61010	900000	0,700.0	191100	250	0 000	0.0635
81X	1143	61010	0.03626	001100	0.01102	6367	0.000	95/00
K200	21.1	61010	0.00026	0 56660	001100	0.367	200.0	0.0034
1000	211	61010	0.03026	0 54400	0.01124	790.0	0000	0.0600
Kata	71.	01010	0.03626	0.56300	001156	190.0	200.0	0.0031
620	31.	01010	0.03626	0.35760	0.01145	0.364	(600.0	97800
K204	1143	61010	0.03626	0.56200	0.01153	0.367	0 000	0.000
K203	21.	0.010	0 0 0 0 5 5 6	0.56600	001163	0.363	0.030	0.0000
KZOS	. 143	01010	0.03626	0.06100	251100	0.367	6669	0.0628
K207	317	01010	0.03026	0.57660	971100	0.357	0 000	0 0043
100	21.1	0.101.0	0.03626	0 00000	001100	780	0.000	0.0627
1000	911	0.101.0	900000	0.58100	100	195.0	0000	0.0000
6210	21.	0.101.0	0.03626	0 55900	001140	0.307	0000	0.0020
1124	1140	01010	0.03626	0.56400	001100	0.367	0.000	0.0004
217	31.1	0.010	0.03626	0.55600	991100	0 387	0.680	0.0626
5525	1145	0.101.0	0.03626	0.58400	001100	195.0	0000	0.0004
*124	2	0.00.0	979000	0.05000	71100	7000	0.000	0.0023
4216	1.143	0.010	0.03626	0.56300	001167	700	0.000	0.0403
M216	3	0.010	950000	0.05660	71100	280	0000	0.0025
100	21.	0.101.0	909000	0.2000	001182	- PE 0	0 000	0.0049
6218	2	0.101.0	979000	0.00000	001147	0 307	0 000	97900
60.59	. 143	01010	0.03626	0.57460	001173	0.307	0 000	0.0643
KZZO	21.1	0.101.0	0.03626	0.05000	001147	190.0	0.000	0.0625
1223	31	01010	909000	0.56760	0.01161	0.367	0 800	0.0035
222	911	0.010	0.03626	0.00100	0.01152	0.367	0.000	0.0628
6323	911	0.010	979700	0.05000	001147	195.0	0 100	0.0625
6324	1143	0.101.0	900000	0.06400	791100	0 387	0 000	0.0632
8228	91.1	91010	0.03636	0.55000	001134	0 367	0000	91900
N228	3	0.001.0	0.03626	0.07000	991100	0.367	0.000	0.0000
K223	1 104	0.101.0	0.03629	0.62360	0.01066	0.466	7 640	0.0661
K228	100	0.1021	0.03622	0 60200	0.01215	0 455	1 545	0.0456
6239	9090	0.1001	0.03670	0.3856.0	0.00000	999-0	7.540	0,0000
828	1.490	0 1030	0.03600	0.77800	0.01449	0 485	7.549	61133
K231	0.250	0 0000	0.03228	0.09460	0.00234	0 485	1.540	0.0220
8533	2037	0.1040	0.03578	1,08100	917100	0 455	7.540	0.1333
223	0.260	0.000	0.03220	0.20200	0.00466	998 0	7 540	000
KSM	0 000	0.1001	0.03620	0 44300	0.00060	999	7.543	00/69
6236	1 104	0.1010	0.03629	0.58240	001100	0.455	1 540	0.0935
2536	1.145	01010	0.03626	0.56300	0.01202	0.367	0 100	0.0963
1621	21.	0.1010	909000	0.5650	001100	795.0	0 000	0.0056
1236	3:1	0.101.0	97900	0.57600	001176	0.387	0 000	0.0845
K236	1145	0.1010	900000	0.06600	991100	190	6 693	0.0037
352	1.143	01010	0.03626	0.56360	951100	0.367	6.800	0.0031
K241	21.1	0100	0.03626	0.56000	001100	0.367	0009	0.0027
X242	1345	01010	909000	0.55600	001140	0.367	0.000	0.6626
1243	21.	0.3010	909000	0.55600	001148	0.367	6 500	9760 0
K244	116	6101 0	979500	0.56200	001153	0.367	0 000	0.0030
X245	1.143	0.101.0	0.03626	0.56700	191100	0 367	0000	0.0035
H246	1143	0.101.0	0.03626	0.03760	001174	795.0	6 890	0.0844
250	21.1	61010	0.03626	0.50600	001162	0.367	0.000	90900
8457	1.143	0.1010	0.03626	0.59900	0.01212	0.360	0.000	0.0070
65.04	1143	61010	900000	0.01200	0.01232	0.307	0000	0.0864

0 000 0 1 100 0 1 100 0

0.357 6.860 0.357 6.860 NA NA

0.63600 0.01252 0.63600 0.01272 16A 16A

0.03626 0.03626 NA

0.1019 1.145 0.1019 NA NA

322

				,	.,	HULLO	II Idg	- 10
Brnh	From To	Tag Conduct	Brnh	From To	Tag Conduct	Drnh	From To	Tag Conduct
1	1 2	1 .178E+01	57	17 301	1 .860E-01	113	32 176	4 .373E+00
2	1 145	4 .306E+00	58	17 301	1 .910E-01	114	32 301	
3	2 3	1 .178E+01	59	18 19	1 -146E+01	115	32 301	
4	2 146	4 .306E+00	60	18 162	4 .373E+00	116	33 34	
5	3 4	1 .178E+01	61	18 301	1 .860E-01			1 .146E+01
6	3 147	4 .306E+00	62	18 301	1 .820E-01	117	33 177 33 301	4 .373E+00
7	4 5	1 .160E+01	63	19 20	1 .146E+01	119		1 .860E-01
8	4 148	4 .306E+00	64	19 163	4 .373E+00	120	33 301 34 35	1 .830E-01
9	5 6	1 .146E+01	65	19 301	1 .870E-01	121		1 .146E+01
10	5 149	4 .373E+00	66	19 301	1 .680E-01	122	34 178	4 .373E+00
11	5 301	1 .954E-01	67	20 21	1 .129E+01		34 301	1 .860E-01
12	6 7	1 .146E+01	68	20 164	4 .373E+01	123	34 301	1 .830E-01
13	6 150	4 .373E+00	69	20 301	1 .870E-01	124	35 36	1 .146E+01
14	6 301	1 .940E-01	70	20 301	1 .870E-01		35 179	4 .373E+00
15	7 8	1 .146E+01	71	21 22	1 .115E+01	126	35 301	1 .860E-01
16	7 151	4 .373E+00	72	21 165	4 -473E+01		35 301	1 .820E-01
17	7 301	1 .920E-01	73	21 301	1 .940E-01	128	36 37	1 .146E+01
18	7 301	1 .240E-01	74	22 23	1 .940E-01	129	36 180	4 .373E+00
19	8 9	1 .146E+01	75	22 166		130	36 301	1 .860E-01
20	8 152	4 .373E+00	76	22 100	4 -473E+00	131	36 301	1 .810E-01
21	8 301	1 .910E-01	77	22 301	1 .770E-01	132	37 38	1 .146E+01
22	8 301	1 .490E-01	78		1 .115E+01	133	37 181	4 .373E+00
23	9 10	1 .146E+01	78		4 .473E+00	134	37 301	1 .850E-01
24	9 153	4 .373E+00	80		1 -420E-01	135	37 301	1 .800E-01
25	9 301	1 .890E=01			1 .115E+01	136	38 39	1 .146E+01
26	9 301	1 .680E-01	81	24 168	4 .473E+00	137	38 182	4 .373E+00
27	10 11		82	24 301	1 .136E+00	138	38 301	1 .850E-01
28	10 154	1 .146E+01	83	24 301	1 .220E-01	139	38 301	1 .780E-01
29		4 .373E+00	84	25 26	1 .115E+01	140	39 40	1 .146E+01
30	10 301	1 .880E-01	85	25 169	4 .473E+00	141	39 183	4 .373E+00
	10 301	1 .820E-01	86	25 301	1 .117E+00	142	39 301	1 .850E-01
31	11 12	1 .146E+01	87	25 301	1 .640E-01	143	39 301	1 .770E-01
32	11 155	4 .373E+00	88	26 27	1 .129E+01	144	40 41	1 .146E+01
33	11 301	1 .870E-01	89	26 170	4 .473E+00	145	40 184	4 .373E+00
34	11 301	1 .910E-01	90	26 301	1 .101E+00	146	40 301	1 .850E-01
		1 .146E+01	91	26 301	1 .850E-01	147	40 301	1 .750E-01
36	12 156	4 .373E+00	92	27 28	1 .146E+01	148	41 42	1 .146E+01
. 37	12 301	1 .860E-01	93	27 171	4 .373E+00	149	41 185	4 .373E+00
38	12 301	1 .970E-01	94	27 301	1 .890E-01	150	41 301	1 .850E-01
39	13 14	1 .146E+01	95	27 301	1 .810E-01	151	41 301	1 .730E-01
40	13 157	4 .373E+00	96	28 29	1 .146E+01	152	42 43	1 .129E+01
41	13 301	1 .850E-01	97	28 172	4 .373E+00	153	42 186	4 .373E+00
42	13 301	1 .100E+00	98	28 301	1 .880E-01	154	42 301	1 .850E-01
43	14 15	1 .146E+01	99	28 301	1 .810E-01	155	42 301	1 .710E-01
44	14 158	4 .373E+00	100	29 30	1 .146E+01	156	43 44	1 .115E+01
45	14 301	1 .850E-01	101	29 173	4 .373E+00	157	43 187	4 .473E+00
46	14 301	1 .101E+00	102	29 301	1 .870E-01	158	43 301	1 .910E-01
47	15 16	1 .146E+01	103	29 301	1 .820E-01	159	43 301	1 .124E+00
48	15 159	4 .373E+00	104	30 31	1 .146E+01	160	44 45	1 .115E+01
49	15 301	1 .850E-01	105	30 174	4 .373E+00	161	44 188	4 .473E+00
50	15 301	1 .100E+00	106	30 301	1 .870E-01	162	44 301	1 .730E-01
51	16 17	1 .146E+01	107	30 301	1 .830E-01	163	44 301	1 .920E-01
52	16 160	4 .373E+00	108	31 32	1 .146E+01	164	45 46	1 .115E+01
53	16 301	1 .850E-01	109	31 175	4 .373E+00	165	45 189	4 .473E+00
54	16 301	1 .970E-01	110	31 301	1 .870E-01	166	45 301	1 .390E-01
55	17 18	1 .146E+01	111	31 301	1 .830E-01	167	46 47	1 .115E+01
56	17 161	4 .373E+00	112	32 33	1 .146E+01	168	46 190	4 .473E+00

Brnh	From To	Tac	Conduct	Brnh	Fr	от То	Tar	Conduct	Brnh	Fr	om To	Tan	Conduct
169	46 101	1	.150E+00	225		301		.860E-01	281	74	301		
170	46 301	î	.250E-01	226		301	1	.810E-01	282	74	301	1	.138E+00
171	47 48	î	.115E+01	227	61	62	î	.146E+01	283	75	76		
172	47 191	4	.473E+00	228	61	205	â	.373E+00	283	75	219	1	.120E+01
173	47 301	- 1	.127E+00	229	61	301	1	.860E-01				4	.473E+00
174	47 301	î	.690E-01	230	61		1		285	75	301		.157E+00
175	48 49	1						.810E-01	286	75	301	1	.900E-01
			.129E+01	231	62	63	1	.146E+01	287	76	77		.125E+01
176	48 192	4	.473E+00	232	62		4	.373E+00	288	76	220		.348E+00
177	48 301	1	.100E+00	233			1	.860E-01	289	76	301		.171E+00
178	48 301	1	.890E-01	234	62	301	1.	.810E-01	290	76	301		.980E-01
179	49 50	1	.146E+01	235	63	64	1	.146E+01	291	77	78		.210E+01
180	49 193	4	.373E+00	236	63	207	4	.373E+00	292	77	221	4	.348E+00
181	49 301	1	.880E-01	237	63	301	1	.860E-01	293	77	301	1	.172E+00
182	49 301	1	.830E-01	238	63	301	1	.800E-01	294	77	301	1	.970E-01
183	50 51	1	.146E+01	239	64	65	1	.108E+01	295	78	79	1	.172E+01
184	50 194	4	.373E+00	240	64	208	4	.373E+00	296	78	222		.288E+00
185	50 301	1	.870E-01	241	64	301	1	.860E-01	297	78	301	1	.124E+00
186	50 301	1	.830E-01	242	64	301	1	.790E-01	298	78	301	3	.910E-01
187	51 52	1	.146E+01	243	65	66	1	.992E+00	299	79	80		.992E+00
188	51 195	4	.373E+00	244	65	209	4	.526E+00	300	79	223		.433E+00
189	51 301	1	.870E-01	245	65		1	.940E-01	301	79	301		.108E+00
190	51 301	1	.830E-01	246	65	301	î	.870E-01	302	79	301		.870E=01
191	52 53	1	.146E+01	247	66	67	1	.172E+01	303	80	81		.108E+01
192	52 196	- a	.373E+00	248	66	210	4	.433E+00	304	80	224		.526E+00
193	52 301	ī	.870E-01	249	66	301	1	.930E-01	305	80	301		.930E-01
194	52 301		.830E-01	250	66	301	î	.103E+00	306	80	301		.910E-01
195	53 54	î	.146E+01	251	67	68	î	.210E+01	307	81			
196	53 197	4	.373E+00	252	67	211	4	.288E+00	308	81	82 225		.146E+01
197	53 301	i	.870E-01	253	67	301	1	.930E-01	308	81	301		.373E+00
198	53 301		.830E-01		67	301	î						.840E-01
199	54 55	î	.146E+01	254	68	69	1	.125E+00	310	81	301		.830E-01
									311	82	83		.146E+01
200	54 198	4	.373E+00	256	68	212	4	.348E+00	312	82	226		.373E+00
201	54 301	1	.870E-01	257	68	301	1	.990E-01	313	82	301		.850E-01
202	54 301		.830E-01	258	68	301	1	.172E+00	314	82	301		.820E-01
203	55 56	1	.146E+01	259	69	70	1	-120E+01	315	83	84		.146E+01
204	55 199	4	.373E+00	260	69	213	4	.348E+00	316	83	227		.373E+00
205	55 301	1	.870E-01	261	69	301	1	.990E-01	317	83	301	1	.850E-01
206	55 301	1	.830E-01	262		301	1	.171E+00	318	83	301		.820E-01
207	56 57	1	.146E+01	263	70	71	1	.115E+01	319	84	85	1	.146E+01
208	56 200	4	.373E+00	264			4	.473E+00	320	84	228	4	.373E+00
209	56 301	1	.870E-01	265	70	301	1	.900E-01	321	84	301	1	.860E-01
210	56 301	1	.820E-01	266		301	1	.157E+00	322	84	301	1	.820E-01
211	57 58	1	.146E+01	267	71	72	1	.115E+01	323	85	86	1	.146E+01
212	57 201	4	.373E+00	268	71	215	4	.473E+00	324	85	229	4	.373E+00
213	57 301	1	.860E-01	269	71	301	1	.710E-01	325	85	301	1	.860E-01
214	57 301	1	.820E-01	270	71	301	1	.138E+00	326	85	301		.820E-01
215	58 59	1	.146E+01	271	72	73	1	.115E+01	327	86	87		.146E+01
216	58 202	4	.373E+00	272	72	216	4	.473E+00	328	86	230		.373E+00
217	58 301	1	.860E-01	273	72	301	1	.330E-01	329	86	301		.860E-01
218	58 301	î	.820E-01	274	72	301	î	.670E-01	330	86	301		.820E-01
219	59 60	î	.146E+01	275	73	74	î	.115E+01	331	87	88		.146E+01
220	59 203	4	.373E+00	276			4	.473E+00	332	87	231		
221	59 301	ī	.860E-01	277	73	301	ĩ	.670E-01	333	87	301		.373E+00
222	59 301	1	.820E-01	277	73	301		.870E-01					.860E-01
222		1		278	74	75	1		334	87	301	1	.820E-01
			.146E+01				1	.115E+01	335	88	89		.146E+01
224	60 204	4	.373E+00	280	74	218	4	.473E+00	336	88	232	4	.373E+00

### Brown To Tag Conduct ### Brown To Tag Cond														
338 88 301 1 .802-01 994 103 1004 1 .102-01 495 117 261 4 .1462-01 493 117 261 4 .7778-00 494 117 261 4 .7778-00 494 117 261 4 .7778-00 494 117 261 4 .7778-00 494 117 261 4 .7778-00 494 117 261 4 .7778-00 494 117 261 4 .7778-00 494 117 261 4 .7778-00 495 118 107 1 .1462-01 494 117 261 4 .7778-00 495 118 107 1 .1462-01 494 117 261 4 .7778-00 495 118 107 1 .1462-01 495 117 261 4 .7778-00 495 118 107 1 .1462-01 495 117 261 4 .7778-00 495 118 107 1 .1462-01 4					Brn	n Fr	on To	Tac	Conduct	Brn	h Fr	on To	Tac	g Conduct
338 88 304 1.826-01 394 103 104 1.466-01 450 117 118 1.146-01 450 89 213 1.756-00 450 117 2014 1.736-00 450 117 20	337	88 301	1 .	850E-01	393	102	301	- 1	.900E-01					
339 99 90 1 1.46E-01 395 103 247 4.775E-00 451 117 261 4.775E-00 481 117 261 4.875E-01 481 825 117 301 1.805E-01 481 825 1	338	88 301	1 .	820E-01	394	103	104	1	.146E+01					
140 20	339	89 90	1 .	146E+01	395	103	247	4	.373E+00					
341 89 JOL 1 . 850F-01 89 104 105 1 . 468F-01 453 117 501 1 . 830F-01 434 89 JOL 1 . 810F-01 89 104 105 1 . 468F-01 454 118 119 1 . 1129E-01 444 89 104 1 . 810F-01 89 104 105 1 . 468F-01 454 118 119 1 . 1129E-01 445 118 301 1 . 129E-01 454 105 104 1 . 129E-01 454 105 105 1 . 129E-01 455 1 . 12	340	89 233	4 .	373E+00				1						
342 89 101 1 1.46E-01 399 104 105 1 1.46E-01 455 118 262 4 1.737E-00 454 118 119 1 1.737E-01 414 30 211 1.46E-01 399 104 248 1.737E-00 455 118 262 4 1.737E-00 454 118 119 1 1.737E-01 418 118 118 118 118 118 118 118 118 11	341													
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345 90 301 1 305-01 001 10 301 1 3405-01 37 119 301 1 3405-01 1446-01 3446 301 301 1 3405-01 344 341 341														
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147 91 92 1 146F01 401 105 101 170BC01 401 102 101 105 101 100BC01 101														
348 91 235 4 .37524-00 694 105 301 1 .7902-01 460 115 301 1 .8602-01 1 340 91 301 1 .8502-01 405 105 301 1 .7902-01 460 115 301 1 .9502-01 4 341 91 301 1 .8502-01 405 105 301 1 .8502-01 461 119 301 1 .9502-01 351 92 93 1 .8452-01 407 105 201 1 .8502-01 462 120 301 4 .8502-01 352 92 236 4 .3752-00 407 105 201 1 .8502-01 462 120 301 1 .8502-01 353 92 301 1 .8502-01 409 105 301 1 .8502-01 462 120 301 1 .8502-01 355 93 94 1 .1452-01 409 105 301 1 .8502-01 462 120 301 1 .1132-00 355 93 94 1 .1452-01 409 105 301 1 .8502-01 462 120 301 1 .1132-00 358 93 301 1 .8502-01 41 107 251 1 .8502-01 469 110 11 .8502-01 469 120 301 1 .85														
349 101 1 1050-01 000 105 101 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1050-01 1 1 1 1 1 1 1 1 1														
300 91 101 1 1016-01 000 106 107 1 148E-01 462 100 121 1 115E-01 135 22 93 1 148E-01 467 100													1	.860E-01
1915 92 93 1 146E+01 407 106 250 4 1771E+00 463 120 264 4 4771E+00 120 275										461	119	301	1	.960E-01
322 226 4 37154-00 409 169 301 3 38105-01 464 120 301 3 48505-01 3 32 32 32 32 32 32 32													1	.115E+01
323 92 101 1 1806-01 400 101 17 180 1 1806-01 1 1 1806-01 1 1 1806-01 1 1 1806-01 1 1 1806-01 1 1 1806-01 1 1 1806-01 1 1 1806-01 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1												264	4	.473E+00
354 92 101 1 .810F-01 11 107 251 4 .773E-00 46 121 222 1 .115E-01										464	120	301	1	.650E-01
325 93 94 1.146Fe01 41 107 251 4 377EF-00 467 121 255 4 4.77EF-00 467 121 255								1	.830E-01	465	120	301	1	.113E+00
136 93 237 4 3775E-00 12 127 301 1 320E-01 468 12 301 1 132E-01			1 .	810E-01	410	107	108	1	.146E+01	466	121	122	1	.115E+01
356 93 237 4 -3778F00 412 107 301 1 -820F-01 468 21 301 1 -220F-01 308	355	93 94	1 .:	146E+01	411	107	251	4	.373E+00	467	121	265	4	.473E+00
357 93 303 1 1 8506-01 413 167 301 1 .8306-01 469 121 301 1 .1132-03 1 1 .8306-01 459 121 301 1 .1132-03 1 1 .8306-01 459 121 301 1 .1132-03 1 1 .8306-01 459 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1132-03 1 1 .8306-01 47 121 301 1 .1326-01 47 1 .8306-01 47 121 301 1 .1326-01 47 1 .8306-01 47 121 301 1 .1326-01 47 1 .8306-01 47 121 301 1 .1326-01 47 1 .8306-	356	93 237	4 .	373E+00	412	107	301	1	.820E-01				1	
388 93 301 1 1.810F-01 44 188 109 1 .146F-01 470 122 123 1 .115F-01 470 123 108 123 4	357	93 301	1 .	850E-01	413	107	301							
399 94 95 1 1.45E-01 45 108 301 1 480E-01 4731 232 256 4 4.732E-00 473 123 256 4 4.732E-00 473 123 250 1 4.732E-00 473 123 123 123 123 123 123 123 123 123 12	358	93 301	1 .1	810E-01				1						
360 94 238 4 .2772E-00 415 183 001 1 .840E-01 472 122 501 1 .420E-01 472 123 501 1 .135E-01 472 123 501 1 .145E-01	359	94 95												
361 94 301 1	360	94 238	4 .	373E+00										
362 94 101 1 1.810F-01 481 109 110 1.146E-01 474 123 267 4 4.773E-00 478 138 138 138 138 138 138 138 138 138 13	361	94 301												
184 95 96 1 146E-01 49 109 283 4 3771E-00 475 123 201 1 7.760E-01 1 1.29E-01														
364 95 239 4 .373E-00 420 109 301 1 .890E-01 477 124 268 4 .473E-00 108 1 .890E-01 477 124 268 4 .473E-00 108 1 .890E-01 478 124 268 4 .473E-00 108 1 .890E-01 478 124 268 4 .473E-00 108 108 108 108 108 108 108 108 108 1	363	95 96												
365 95 301 1.850-01 422 109 301 1.350-01 477 124 268 4 4.4732-00 4 6 95 301 1.850-01														
366 95 103 1 .810F-01 422 110 111 1 .148E-01 478 124 501 1 .940E-01 1 .810E-01 4 .810E-0														
367 96 97 1 1298-01 421 110 254 4 3.7718-00 479 129 126 1 1.1485-01 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1														
368 96 240 4 37725-00 242 11 301 1 3595-01 480 12 259 4 37725-00 389 60 12 350 301 1 3505-01 4 4005-01 399 302 1 3805-01 4 4005-01 399 302 1 3805-01 4 4005-01 399 302 1 3805-01 4 4005-01 399 302 1 3805-01 4 442 227 301 1 3805-01 442 12 201 1 3805-01 482 12 201 1 3805-01 482 12 201 1 3805-01 482 12 201 1 3805-01 486 126 201 1 3805-01 1 3805-01 486 126 201 1 486 202 201 1 3805-01 1 486 126 201 1 486 202 201														
369 96 301 1 18467-01 425 110 301 1 18458-01 481 125 301 1 18058-01 181 307 307 307 307 307 307 307 307 307 307														
370 96 901 1														
371 97 98 1.115F001 429 111 301 1.550E-01 484 122 127 1.146E-01 1772 97 241 1.461E-01 1772 97 241 1.461E-01 1772 97 241 1.50E-01 489 1126 117 1.550E-01 484 122 770 4.775E-00 1772 97 101 1.50E-01 489 1126 117 1.50E-01 489 1126 101 1.50E-01 489 1126 1126 1126 1126 1126 1126 1126 112														
372 97 241 4 4732-00 428 111 301 1 8308-01 484 128 270 4 8732-00 1 773 97 301 1 8008-01 1 8308-01 1 801 1 8008-01 1														
377 97 701 1 2006-01 429 111 201 1 2016-01 485 128 501 1 1.6002-01 1 2017 4 97 103 1 2 3008-01 1 3 103 112 113 1 1.4688-01 486 128 501 1 1.6002-01 1 2017 4 97 103 1 2 30 1 1 2 30 1 1 2 30 1 2 3 1 2														
374 97 101 1 .3050-01 31 112 25 4 .773E-00 491 123 12 1.46E-01 486 126 301 1 .860E-01 377 98 99 144 4 .473E-00 431 112 25 6 .773E-00 481 127 21 28 1 .146E-01 378 98 144 4 .473E-00 432 113 11 201 1 .850E-01 488 127 27 12 4 .773E-00 47 127 12 28 1 .146E-01 379 98 100 1 .13E-00 401 113 114 1 .146E-01 40 127 301 1 .850E-01 30 127 30 1 .1850E-01 30 1 .1850E-01 30 127 30 1 .1850E-01 30														
375 98 99 1 1155-01 31 112 256 4 37715-00 487 127 128 1 1.1465-01 1776 98 424 4 4.7715-00 431 112 301 1 8508-01 48 6127 2714 4 7775-00 1776 98 424 4 4.7715-00 431 112 301 1 8508-01 48 6127 2714 4 7775-00 1776 98 101 1 1255-01 4 1125-01 11														
376 98 442 4 47375-00 32 112 301 1 8508-01 488 127 271 4 1775-00 77 98 103 1 1 6508-01 1 8508-01 1 8508 127 301 1 8508-01 1 85														
377 98 101 1 .6906-01 431 112 001 1 .8906-01 489 127 001 1 .8906-01 730 89 107 1 .1328-00 431 113 141 .1468-01 490 127 301 1 .8908-01 739 99 100 1 .1328-01 435 113 257 4 .7758-00 491 128 128 12 1 .1468-01 491 128 128 1 .1468-01 491 128 128 1 .1468-01 491 128 128 1 .1468-01 491 128 128 128 1 .1468-01 739 129 101 1 .1468-01 491 128 128 129 1 .1468-01 738 139 139 101 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 1 .1468-01 491 128 128 129 129 1 .1468-01 491 128 128 129 129 1 .1468-01 491 128 128 129 129 1 .1468-01 491 128 128 129 129 1 .1468-01 491 128 128 129 129 1 .1468-01 491 128 128 128 129 129 1 .1468-01 491 128 128 128 129 129 1 .1468-01 491 128 128 128 129 129 1 .1468-01 491 128 128 128 129 129 1 .1468-01 491 128 128 128 129 129 1 .1468-01 491 128 128 128 129 129 1 .1468-01 491 128 128 128 129 129 1 .1468-01 491 128 128 128 128 128 128 128 128 128 12														
378 98 103 1 .1325-00 434 113 114 1 .1465-01 490 127 501 1 .8595-01 1 .7575-0														
379 99 100 1 1158-01 33 113 257 4 3775-00 491 128 129 1 1.1465-01 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					433	112	301	1	.830E-01	489	127	301	1	.820E-01
380 99 243 4 473124-00 436 113 501 1 .8505-01 492 128 272 4 .773125-00 138 19 9101 1 .2605-01 477 113 501 1 .8505-01 492 128 272 4 .773125-00 138 19 9101 1 .1405-00 438 114 115 1 .1405-01 494 128 301 1 .8405-01 138 100 1014 1 .1355-01 491 114 238 4 .773125-00 495 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 130 1 .1405-01 405 129 140 140 140 140 140 140 140 140 140 140		98 301	1 .	123E+00	434	113	114	1	.146E+01	490	127	301	1	.850E-01
391 99 101 1 2606-01 477 113 101 1 2507-01 493 128 301 1 25105-01 133 139 131 313 131 131 131 131 148E-01 494 128 301 1 25105-01 133 139 130 131 131 131 131 131 148E-01 148E-01 148 128 301 1 25105-01 148 139 131 131 131 131 131 131 131 131 131	379	99 100	1 .	115E+01	435	113	257	4	.373E+00	491	128	129	1	.146E+01
382 99 901 1 1458-00 38 114 115 1 1468-01 494 128 901 1 1.840E-01 38 100 101 1 1.158-01 49 114 258 7 1773E-00 495 129 110 1 1.465E-01 184 100 244 4 4.773E-00 496 114 201 1 1.850E-01 496 129 270 1 4.773E-00 496 129 270 4 4.773E-00 496 129 270 1 4.773E-00 497 120 120 120 120 120 120 120 120 120 120	380	99 243	4 .	473E+00	436	113	301	1	.850E-01	492	128	272	4	.373E+00
382 99 301 1 .1498-00 439 114 115 1 .1468-01 494 128 301 1 .8408-01 31 310 310 11 1.1358-01 491 114 258 4 .7738-00 495 129 130 1 .1468-01 138 100 244 4 .4738-00 440 114 301 1 .5508-01 496 129 277 4 .3738-00 138 100 244 4 .4738-00 440 114 301 1 .5508-01 496 129 277 4 .3738-00 138 101 301 1 .1158-01 421 151 16 .1468-01 149 129 301 1 .8308-01 138 101 301 1 .1358-01 421 151 16 .1468-01 149 129 301 1 .8308-01 138 101 301 1 .5308-01 441 115 301 .8408-01 50 110 274 4 .7738-00 139 101 21 1 .7338-01 110 11 .1468-01 139 101 101 1 .7338-01 110 11	381	99 301	1 .:	260E-01	437	113	301	1	.830E-01	493	128	301	1	.910E-01
383 100 101 1 1.1158-01 49 114 258 4.773E-00 495 129 130 1 1.146E-01 385 100 101 1 .1158-01 40 114 301 1 .850E-01 46 129 273 4.773E-00 385 100 101 1 .380E-01 441 114 301 1 .850E-01 497 129 301 1 .970E-01 385 100 102 1 .1158-01 421 115 116 1 .146E-01 149 129 301 1 .970E-01 387 101 1245 4 .473E-00 441 114 301 1 .840E-01 497 129 301 1 .970E-01 387 101 1245 4 .473E-00 441 115 259 4 .773E-00 489 130 131 1 1.146E-01 387 101 124 124 124 124 125 116 1 .840E-01 498 130 131 1 1.146E-01 389 130 12 1 .770E-01 124 124 125 126 125 125 125 125 125 125 125 125 125 125	382	99 301	1 .	149E+00	438			1						
384 100 244 4 .473E-00 440 114 301 1 .890E-01 496 129 279 4 .777E-00 318 100 1021 1 .890E-01 497 129 301 1 .797E-01 1 .79														
385 100 101 1 .3805-01 441 114 001 1 .8305-01 497 129 301 1 .9705-01 136 101 102 1 .1155-01 427 115 101 1 .1465-01 138 123 301 1 .8305-01 137 101 245 4 .4715-00 440 115 259 4 .7715-00 499 130 131 1 .1465-01 138 101 101 1 .5205-01 441 115 301 1 .8405-01 300 100 274 4 .7715-00 138 101 101 1 .7315-00 139 102 101 1 .1465-01 139 102 101 1 .1255-01 101 101 101 101 101 101 101 101 101	384	100 244	4	473E+00	440	114	301	1						
386 101 102 1 .1158*01 442 115 116 1 .146*01 488 129 301 1 .8302*01 1 .8302*01 387 101 245 4 .4732*00 441 115 259 4 .7732*00 499 130 131 1 .1465*01 388 101 301 1 .7202*01 444 115 201 1 .8302*01 500 130 274 4 .7732*00 499 130 130 1 .7202*01 445 115 301 1 .8302*01 501 130 301 1 .1002*00 390 102 103 1 .7202*01 445 115 301 1 .8302*01 501 130 301 1 .1002*00 390 102 103 1 .1252*01 445 115 107 1 .1465*01 502 130 301 1 .1302*01 501 1002*01 1 .1465*01 1000*00*00*00*00*00*00*00*00*00*00*00*00														
387 101 245 4 4.773E+00 443 115 259 4 .779E+00 499 130 131 1 .146E+01 1 .888 101 301 1 .920E+01 444 115 301 1 .880E+01 500 130 274 4 .779E+00 389 103 301 1 .720E+01 445 115 301 1 .880E+01 501 130 301 1 .100E+00 1 .880E+01 501 130 130 1 .146E+01 1 .880E+01 1														
388 101 301 1 .920E-01 444 115 301 1 .840E-01 500 130 274 4 .373E+00 399 101 301 1 .720E-01 445 115 301 1 .830E-01 501 130 301 1 .00E+00 399 102 101 1 .729E+01 446 116 117 1 .146E+01 502 130 301 1 .830E-01 931 102 246 4 .473E+00 447 116 260 4 .373E+00 501 131 132 1 .146E+01														
389 101 301 1 .720E-01 445 115 301 1 .830E-01 501 130 301 1 .100E-00 390 102 103 1 .129E-01 446 116 117 1 .146E+01 502 130 301 1 .830E-01 391 102 246 4 .473E+00 447 116 260 4 .373E+00 503 131 132 1 .146E+01														
390 102 103 1 .129E+01 446 116 117 1 .146E+01 502 130 301 1 .830E-01 391 102 246 4 .473E+00 447 116 260 4 .373E+00 503 131 132 1 .146E+01														
391 102 246 4 .473E+00 447 116 260 4 .373E+00 503 131 132 1 .146E+01														
372 102 301 1 .1245-00 440 110 301 1 .840E-01 504 131 2/5 4 .3/3E+00														
	392	102 301	1 -	1245+00	948	110	301	1	.040E-01	504	131	215	4	.3/3E+00

Brnh From To		Brnh From To	Tag Conduct	Brnh From To	Tag Conduct
505 131 301	1 .101E+00	561 158 157	5 .790E+02	617 214 213	5 .790E+02
506 131 301	1 .830E-01	562 159 158	5 .790E+02	618 215 214	5 .790E+02
507 132 133	1 .146E+01	563 160 159	5 .790E+02	619 216 215	5 .790E+02
508 132 276	4 .373E+00	564 161 160	5 .790E+02	620 217 216	5 .790E+02
509 132 301	1 .100E+00	565 162 161	5 .790E+02	621 218 217	5 .790E+02
510 132 301	1 .830E-01	566 163 162	5 .790E+02	622 219 218	
511 133 134	1 .146E+01	567 164 163	5 .790E+02	623 220 219	
512 133 277	4 .373E+00	568 165 164	5 .790E+02		
513 133 301	1 .970E-01	569 166 165	5 .790E+02	624 221 220	5 .790E+02
514 133 301	1 .830E-01	570 167 166	5 .790E+02	625 222 221	5 .790E+02
515 134 135	1 .146E+01	571 168 167	5 .790E+02	626 223 222	5 .790E+02
516 134 278				627 224 223	5 .790E+02
	4 .373E+00	572 169 168	5 .790E+02	628 225 224	5 .790E+02
517 134 301	1 .910E-01	573 170 169	5 .790E+02	629 226 225	5 .790E+02
518 134 301	1 .840E-01	574 171 170	5 .790E+02	630 227 226	5 .790E+02
519 135 136	1 .146E+01	575 172 171	5 .790E+02	631 228 227	5 .790E+02
520 135 279	4 .373E+00	576 173 172	5 .790E+02	632 229 228	5 .790E+02
521 135 301	1 .820E-01	577 174 173	5 .790E+02	633 230 229	5 .790E+02
522 135 301	1 .840E-01	578 175 174	5 .790E+02	634 231 230	5 .790E+02
523 136 137	1 .146E+01	579 176 175	5 .790E+02	635 232 231	5 .790E+02
524 136 280	4 .373E+00	580 177 176	5 .790E+02	636 233 232	5 .790E+02
525 136 301	1 .680E-01	581 178 177	5 .790E+02	637 234 233	5 .790E+02
526 136 301	1 .860E-01	582 179 178	5 .790E+02	638 235 234	5 .790E+02
527 137 138	1 .146E+01	583 180 179	5 .790E+02	639 236 235	5 .790E+02
528 137 281	4 .373E+00	584 181 180	5 .790E+02	640 237 236	5 .790E+02
529 137 301	1 .490E-01	585 182 181	5 .790E+02	641 238 237	
530 137 301	1 .870E-01	586 183 182	5 .790E+02	642 239 238	
531 138 139	1 .146E+01	587 184 183	5 .790E+02		5 .790E+02
532 138 282	4 .373E+00			643 240 239	5 .790E+02
532 138 282		588 185 184	5 .790E+02	644 241 240	5 .790E+02
		589 186 185	5 .790E+02	645 242 241	5 .790E+02
534 138 301	1 .880E-01	590 187 186	5 .790E+02	646 243 242	5 .790E+02
535 139 140	1 .146E+01	591 188 187	5 .790E+02	647 244 243	5 .790E+02
536 139 283	4 .373E+00	592 189 188	5 .790E+02	648 245 244	5 .790E+02
537 139 301	1 .900E-01	593 190 189	5 .790E+02	649 246 245	5 .790E+02
538 140 141	. 1 .160E+01	594 191 190	5 .790E+02	650 247 246	5 .790E+02
539 140 284	4 .373E+00	595 192 191	5 .790E+02	651 248 247	5 .790E+02
540 140 301	1 .910E-01	596 193 192	5 .790E+02	652 249 248	5 .790E+02
541 141 142	1 .178E+01	597 194 193	5 .790E+02	653 250 249	5 .790E+02
542 141 285	4 .306E+00	598 195 194	5 .790E+02	654 251 250	5 .790E+02
543 142 143	1 .178E+01	599 196 195	5 .790E+02	655 252 251	5 .790E+02
544 142 286	4 .306E+00	600 197 196	5 .790E+02	656 253 252	5 .790E+02
545 143 144	1 .178E+01	601 198 197	5 .790E+02	657 254 253	5 .790E+02
546 143 287	4 .306E+00	602 199 198	5 .790E+02	658 255 254	5 .790E+02
547 144 288	4 .306E+00	603 200 199	5 .790E+02	659 256 255	5 .790E+02
548 145 302	5 .790E+02	604 201 200	5 .790E+02		
549 146 145	5 .790E+02	605 202 201	5 .790E+02	660 257 256	5 .790E+02
550 147 146	5 .790E+02			661 258 257	5 .790E+02
		606 203 202		662 259 258	5 .790E+02
551 148 147	5 .790E+02	607 204 203	5 .790E+02	663 260 259	5 .790E+02
552 149 148	5 .790E+02	608 205 204	5 .790E+02	664 261 260	5 .790E+02
553 150 149	5 .790E+02	609 206 205	5 .790E+02	665 262 261	5 .790E+02
554 151 150	5 .790E+02	610 207 206	5 .790E+02	666 263 262	5 .790E+02
555 152 151	5 .790E+02	611 208 207	5 .790E+02	667 264 263	5 .790E+02
556 153 152	5 .790E+02	612 209 208	5 .790E+02	668 265 264	5 .790E+02
557 154 153	5 .790E+02	613 210 209	5 .790E+02	669 266 265	5 .790E+02
558 155 154	5 .790E+02	614 211 210	5 .790E+02	670 267 266	5 .790E+02
559 156 155	5 .790E+02	615 212 211	5 .790E+02	671 268 267	5 .790E+02
560 157 156	5 .790E+02		5 .790E+02	672 269 268	5 .790E+02
130				09 200	J 90ET02

Brnh Fr	om To	Tag Conduct
673 270	269	5 .790E+02
674 271	270	5 .790E+02
675 272	271	5 .790E+02
676 273	272	5 .790E+02
677 274	273	5 .790E+02
678 275	274	5 .790E+02
679 276	275	5 .790E+02
680 277	276	5 .790E+02
681 278	277	5 .790E+02
682 279	278	5 .790E+02
683 280	279	5 .790E+02
684 281	280	5 .790E+02
685 282	281	5 .790E+02
686 283	282	5 .790E+02
687 284	283	5 .790E+02
688 285	284	5 .790E+02
689 286	285	5 .790E+02
690 287	286	5 .790E+02
691 288	287	5 .790E+02

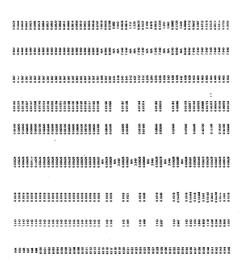
TASS GENERAL INPUT MENU - SI Units

THOO SHARRER FIRST TIERS OF SHARE

(1) Case Title: TALSR(METRIC)RUN 4. COMPLEX MODEL, MASS FLOW	OF 272.2 kg/hr (600	lbm/hr)
(2) Nodes	288	
(3) Constant Temperatures	2	
(4) Unique Exponents	0	
(5) Temperature Dependent Conductances	0	
(6) Temperature Dependent Heat Inputs	0	
(7) Computational Accuracy	.0100	
(8) Starting Temperature	25.0	

4	PULDATA	-1								- 1
٥	Fintengin (1)	Fin Thickness	Fin specking (c)	Paternal Con	Reynolds Number	Prandii Number	Outer pipe diameter	breer pipe dismeder	Pipe Atres	
	(tun)	(um)	(um)	(Milliam K)	000000	4 141	(con)	(cas)	(100 (101)	
1		100								
	W. Made on	Change of the san of	Change of Change Oversion	Mana Translate Coefficient Da	P. Lean	,	Out between Market	Charleston	A. Vete	
		Comment street (b)	Cawaria Lanimon		-	200	CHI. SURVINE PARENT	-	and a	
		7		(Variables)	Out of	2	Assi		Casa	
	×			××			0 303	MM	17784	
				900			100.0		4 6000	
	2 1			200						
	2			42			0 334	**	1 6043	
	2			×2			190 0	4.72	1.4612	
	2			2.040			0 367	× 2	1354	
	2	31.	0.101.0	92900 0	0 00200	0.01333	0.367	6.860	0.0954	
	ğ	31.1	0.101.0	0.03620	0.06600	0.01314	0.367	6.000	0.0940	
	2	1.163	0.101.0	0.03626	0.65200	0.01291	0.367	0.000	0.0924	
	9	9600	0.0661	004740		0.00282	0.367	0 000	0 0241	
	K10	911	01010	0.63636	0.63300	0.01206	0.367	0.000	0,000	
	×	0.260	0.0800	0.03007		0 00000	0.387	0.000	0.0492	
	K12	110	01010	900000	0 62100	0.01245	0.387	0.000	0,000,0	
	KIS	0.414	91600	0.0000		0 00037	0 367	0.000	0.0682	
	K14	1169	01010	0.03626	0.60800	0.01226	0.367	0.000	0.000	
	XIE	1540	0,000	0.03749		901130	190.0	0.000	61000	
	×16	116	0.1010	0.03626	0.66000	0.01210	0.367	0 500	0,000	
	K17	0.620	0.0002	0.03716		0.01271	0.367	6.860	0.0011	
	X10	31.1	0.1010	0.03626	0.66000	001100	0.367	0.000	0.000.0	
	K10	1990	0.0000	0.03098		0.01354	0 367	0.000	00000	
	S	3.	0.1010	0.03626	0.00400	0.01188	0.367	0.000	0.0654	
	121	0716	0.0003	0.03000		0.01400	0.367	0.000	0.100	
	K22	31.	0.101.0	0.03626	0 56100	001104	0.367	6.860	0,000,0	
	123	0.732	0.0004	0.03686		0.01419	0 367	6.860	0.1013	
	*	31.1	0.1010	909000	0.56100	901164	0.367	0990	0.000.0	
	125	21.1	0.1010	0.03600	0.56100	901100	0.367	0990	0.0850	
	126	21.1	0.1019	929600	0.54500	0.01160	0.367	0.000	90900	
	121	31.	0.1019	0.03628	0.56000	0.01198	0.367	6.860	0,000	
	100	31.1	0.1010	0.03628	0.59600	0.01207	0.367	9990	0.0867	
	200			<2			0.416	MA	12807	
	×30	21.1	0.1010	0.0000	000000	0.01216	0.367	0 000	67600	
	ē			MIN			0.466	MA	1.1524	
	200			2.040			0.465	MA	14397	
	600	1.104	0.1010	0.00629	000000	901100	9940	2.540	0.0044	
	2	0 608	0.1001	0.00670	0.44900	0.00900	0.465	7.543	00110	
	502	0.296	0 0000	0.03028	0.20300	909000	0.465	7.540	0.0419	
	25	2037	0.1040	0.03578	1.10100	0.01745	0.465	7.540	0.1355	
	201	0.290	0 0000	0.03628	000000	0.00231	0 405	7.540	0.0210	
	250	1 496	0.1030	0 0 0 0 0 0	0.62200	103100	0.466	7.540	0.1171	
	K30	0.808	0.1001	0.03670	0.36000	00000	0.465	2.540	0.0642	
	X-40	1.184	0.1021	0 03622	0.66100	0.01266	0 400	7.540	0 1012	
	K41	101	0.1016	0.03620	0.51400	0.01076	0 466	2.540	0.000	

0.000	90900	0.0001	0.0013	0.0674	0.0620	0.0000	0.0626	0.0000	00000	0.0002	0 (00)	0,000	0.0000	0.0000	9790 0	0.0000	0.0000	0.0655	0.0010	0.0034	00700	0.0052	0 6784	0.0000	99700	0.0049	0.0747	0.0847	0.0126	0.0047	11/00	0.0007	0.1240	0.0726	7700	0.000	0.0241	0.1265	0.0607	0.1004	0.0000	0.0076	0.0633	0.0674	0.0633	0.0673	0.0631	0.000	0.000	0.0020
0999	0 000	0 600	0.000	0990	0 200	0.000	0.600	0.000	0020	0 800	6 860	0.000	0.000	0.860	0.500	0.000	0.060	0 260	0.000	0.000	0.000	0.860	9 9 9 9	0 900	0.000	0.660	0.860	0.000	0.860	0.660	0.000	7.840	2 540	7.540		200	9	7.540	7.640	2 540	950	0 000	09909	0 990	0999	0.000	0.040	6.860	0.000	0.000
0.762	280	195.0	0.367	0.367	1950	0.367	0.86	195.0	0.387	0.367	0.362	0.367	0.367	680	195.0	0.367	0.367	0.367	190.0	0 367	0.00	0.307	0.367	196 0	0.367	0 387	0.387	100.0	0 387	0.367	780	0.405	0.405	0.485	0.405	9 1	2000	0.465	0 405	0.405	0.465	0.367	0.367	0.367	0.307	196.0	6.367	0.367	0 367	0.367
0.01741	91110	001120	0.01120	0.01218	901139	0.01210	0.01147	0.01206	0.01163	0.01201	601169	0.01100	6,0116.9	001100	001148	001103	0.01139	001100	901159	0.01100	001100	601100	0.01007	0.01104	0.01063	001103	0.01034	0.01170	00100	001100	0.00000	001100	0.01001	0.00011	001100	90000	0.0000	0.01625	0.00057	0.01270	0.01127	0.01220	0.01158	0.01218	001100	0.01216	901165	0.01213	001153	0.01212
0.61610	0.04100	000190	0.54700	0,6030	0.65360	0.50000	0.00000	000000	0.56200	0.56200	0 66260	000000	0.00000	0.00000	0.09900	0.50600	0.55360	0.58500	0.54360	0.58450	0.63160	0.56260	0 62300	00100	0.0000	0.00000	00169 0	0.07600	0.47600	0.57800	0.46100	0.00000		0.4160	4	0.18600	01110	0.00000	0.39000	0.04600	0.54500	0.00400	0.56660	0,60300	0.00000	0.60200	0.66300	0.00000	0.56200	0.56000
909000	90000	0.03626	0.03626	0.03626	0.03626	0.03626	0.03626	92950'0	0.03626	0.03626	979000	979000	909000	950000	0.03626	0.03626	0.03626	979000	979500	0.03020	0.03626	979000	0.03626	9797.00	0.03626	92900 0	0.00620	0.03620	0.03620	0.03626	0.03620	0.03629	0.03667	0.09670	0.03741	0.03820	0.0000	0.03564	0.09620	0.03610	0.00029	0.03676	0.03620	979000	0.03626	979000	0.03626	0.03626	923600	979000
01010	0.010	0.1010	0.1010	0.1010	0.1010	91010	0.1019	0.101.0	0.1010	0.1010	0.1010	0.1010	61010	0.1010	0.1010	0.1010	0.1010	0.1010	91010	0.1010	0.1010	0.1010	0.101.0	0.1010	0.101.0	0.101.0	0.101.0	0.101.0	0.101.0	0.101.0	0.101.0	0.101.0	0.1006	0.1001	0.000	00000	0.000	0.1037	0.1001	0.1022	0.1010	0.1010	0.1010	0.1019	0.1010	0.1010	0.1010	6101.0	0.1019	0.1019
1110	110	311	1140	911	110	1.163	116	1140	1143	911	1160	311	311	31.1	1.143	1.163	31.	1.143	1.145	1.163	31.1	911	911	911	3	31.1	31.1	21.1	21.1	21.1	1.143	1.104	0.000	0.000	0.560	0.200	2,000	1 410	0.000	1 226	1.104	1.163	21.1	31.1	21.1	1.163	31.1	312	116	21.1
cox.	3	***	446	240	KA	X 45	37	97	1931	200	32	100	993	620	197	827	927	991	9	K62	282	101	200	970	197	200	200	K70	ž	22	52	2	50	ş	ò	2	2 5	7	3	44	164	245	992	3	99%	992	3	5	KEZ	35



1.163	0.000	92900 0	0.56700	001161	0 450	01040	0.0677
3:	A101.0	979000	0.06400	0.01157	0.429	9704	0.0073
2037	0.1040	0.03378	0.976.0	00100	9920	7.540	0 1242
31.	0.101.0	0.00626	0.56360	901100	0.700	1540	11000
1.48	0.1030	0.0360	0.71900	0.01376	0 315	7.540	0 1077
1.15	0.1019	979000	0.56200	601153	0.312	2540	0.0070
1.164	0.1021	0.03622	0.58300	0.01164	7.0	2 540	0.0433
21.1	01010	90000	0 20000	001100	100	7.549	0000
2	0.1010	979000	007700	171100	000	2000	0.0042
2	0.101.0	0.03626	0.55600	4100	0.30	0000	0.002.0
3	0.101.0	9,900 0	00/800	000	0.00	200	0000
311	01010	979000	0.000	4	0.00	200	2000
317	0.1010	979600	0.00700	001100	0.00	2000	70000
31.	01010	979000	0.55600	******	200	3 1	2000
1.143	0.1010	979000	0.00000	200	0.00	2000	0.0000
3:	01010	003600	0.05400	200	100.0	2000	17000
2	0.1010	979000	0.00000	200	200	200	0.0000
2	0.1010	97700	0.06300	2000	1000	0 1	00000
2	0 10	0.0000	0.00000	200			
2	0.1010	97900	20000	200			1
2:	0.010	979000	0.0000	2000		0000	0.000
2	0.00	979770	2000		-	1	2000
2 3	91010	0.0000	0.000	2100	30	1	91900
		20000	0.044.00		200	0.000	0.0404
	0.00	00000	0.6660	001130	0.369	0070	0.0014
2	01010	000000	0.56300	781100	0.367	200 0	0.000
911	6101.0	603000	0.54700	001120	0.367	0.000	0.0013
31	0.101.0	0.03626	0.56400	0.01166	0.367	0.000	0.0002
1143	61010	0.03628	0.54600	0.01126	0.367	0 000	0.0010
911	0.1010	0.03628	0.66100	91100	6.367	0 000	0,000
116	0.1019	0.03626	0.54400	0.01124	6363	0.000	00000
1163	0.1010	0.03626	0.0000	0.01162	0.367	0.000	0.0040
1140	0.1010	0.03626	0.54300	0 01122	6367	0.000	0.0000
311	0.1010	979600	0.07.00	221100	0.367	0 800	0.0046
1.143	0.1010	0.03626	001100	011100	0.367	0.800	0.0000
3.	0.1010	0.03626	0.57000	0.01176	0.367	0.800	0.0845
31.1	0.1019	0.03626	0.04000	211100	0.367	0 000	0.000
1.163	0.1010	0.03620	0.67000	0.01174	0 367	0000	1000
31.1	0.1019	979000	0.53603	911100	0.367	0.000	0 0000
101	0.1010	603600	0.56300	91100	0 465	7 540	00000
1.226	0.1022	0.03618	0.00000	001100	0.465	7.640	00000
9090	0.1001	0.03670	0.38600	0.00067	0.403	7.540	10000
1 860	0 1007	0.03564	0.00000	0.01677	0.465	7.540	0.1220
0.298	0 0000	0.000	0.11600	0.00208	0.465	2.540	0 0000
3.5	0.1048	0.03560	1.44400	0.01017	0.405	7.540	0.1485
0.296	0.0004	0.03826	0.18000	0.00443	0 465	7 540	11500
0.644	0.1001	0.60630	0.41300	0.00002 1.1	0.465	244	0.0721
1.164	0.1010	0.00029	0.55100	0.01136	0.465	2.540	76000
21.	0.1019	979090	0.50400	0.01000	0.307	6.860	0.0763
21.1	0.101.0	0.03626	0.00000	001163	0.367	0.000	0 0038
21.1	91016	0.03626	00/140	0.0100	0 367	6.000	67760

K150	21.1	0.101.0	900000	0.06700	0.01161	0.307	0000	0.0035
KIN	1.145	0.1010	929070	0.55100	0.01102	1000	0 0000	1000
K230	1.145	01010	979000	0.56660	001100	0.00	0.000	0.0034
KON	21.1	91010	92900 0	0.54400	0.01124	295.0	2000	0.0000
KOOS	116	61010	979000	0.50300	991199	195.0	0.000	0.0531
K203	3.	0.1010	0.03626	0.55700	001140	0.367	0000	0.0024
KIDA	21.1	51010	92909.0	0.54200	6,01153	636	0000	00000
N.706	21.1	0.1019	900000	0 56660	0.01163	0.367	200	0.000
K208	911	0.101.0	97909 0	001950	0.01152	0.367	0000	0.0000
K207	21.1	01010	0.00000	0.5/600	9/1100	0.367	200 9	0.0045
K208	21.1	0.1010	900000	0.56000	001100	2000	2600	0.0027
6300	911	01010	0.03626	0.00100	0.01184	0.347	0.000	0,0000
6210	911	91010	0.00026	0.65900	001140	0.36.0	9000	0.0000
11511	911	0.1010	900000	0.08400	001100	0.367	0.000	90900
223	911	01010	0.03626	0.65600	41100	0 367	0.000	97400
6213	291	01010	0.00626	0.08400	001100	700.0	0.000	00000
101	911	0.101.0	0.03026	0.05000	601147	195.0	0000	0.0020
6216	911	0.101.0	0.03626	0.68360	0.01182	0.367	0.000	0.0000
K216	211	01010	909000	0.55800	001147	0.362	260 9	0.000
100	1.143	01010	000000	0.50000	0.01182	200.0	0000	00000
6216	1140	01010	0.00000	0.05000	0.01147	0.367	0.000	0.0025
010	1.143	91910	0.03626	0.67400	601173	290	0 000	0.0043
9530	911	01010	0.0000	0.55000	001142	200	0.000	0.0025
100	911	91910	979000	0.56200	001161	O 363	0.000	0.0633
*****	91	01010	909000	0.56100	0.01162	2000	0.000	0.0028
*****	9	01010	909090	0.55600	0.01147	755.0	0.000	0.0020
200	9	01010	979000	0.06400	401157	0 367	0 000	0.0632
****	9	01010	0.03626	0.0000	001134	0.362	0.000	01000
K1200	3	0.010	0.00020	0.57660	991100	0.367	0000	0.0030
K227	101	01010	0.0000	0.62200	0.01060	0.406	7.640	0.0003
4000	-	0.1021	0.00622	0.00200	0.01216	0.446	7.540	95500
20.00	978.0	1001 0	009000	0.36600	0.00000	0.465	2.649	0,000
		0.000	000000	0.77800	001110	0.465	2 545	6.1133
	9 3 50	0000	0.03428	0.09400	0 00034	0.465	7.540	2700
	2037	0.1040	0.03578	106100	91/100	0.465	1.040	61333
*****	0.260	90000	0.03428	0.20200	989-00-0	0.466	2.040	0.0417
100	9090	0.1601	00900	0 44300	0.00000	0.466	7.649	6,6763
K236	-	61010	0.00629	0.54200	991100	0.445	2.040	0.0435
KSW	3	9104.0	95900 0	0.54300	0.01202	0 367	0.000	0.0003
K237	911	91010	0.03626	0.58800	0.01190	0 397	6.000	0.0465
K238	21.	91010	0.03626	0.57660	0.01170	0.367	0.000	0.0045
K230	21.1	0.101.0	9,600,0	0.56600	991100	0.367	0.000	0.0037
K240	21.1	61010	909000	0.06300	0.01165	0.367	0.000	0.0031
K241	1.143	0.1010	979070	0.00000	051100	0.362	6.090	0.0627
K242	21.5	91010	92900'0	0.65600	001146	795'0	0.000	9000
K243	1.143	61010	0.00620	0.55600		0,007	6 893	0.0020
K244	1.163	91010	979000	0.56200	001163	296.0	000 9	00000
K245	3.	0.1010	900000	0.56760	0.01161	195.0	0 890	0.0636
K248	1.143	0.1010	0.00626	0.67550	0.01174	296.0	6 500	0.0544
1247	116	0.1010	0.00026	0.56600	0.01192	0.367	0 800	0.0000
K246	31.	0.0010	92900 0	0.00000	0.01212	0.367	0000	0.0670
4.746	31.1	21010	0.03626	0.61200	0.01232	0.367	0,660	00000

100 N

0.62000 0.01253 0.62300 0.01222 NA NA

0.101.0 0.101.0

> > 131

134	22 pranci	Connection	Summar	y 1n	W/degC	or Watt	s if Tag	= 10
Brnh	From To	Tag Conduct	Dan-1	P=== =	Tag Cond			
1	1 2	1 .178E+01		17 301			n From To	Tag Conduct
2	1 145	4 .933E+00		17 301				4 .114E+01
3	2 3	1 .178E+01		18 19				1 .860E-01
4	2 146	4 .933E+00			1 .146E			1 .830E-01
5	3 4	1 .178E+01		18 162	4 .114E		33 34	1 .146E+01
6	3 147			18 301	1 .860E		33 177	4 .114E+01
7	4 5			18 301	1 .820E		33 301	1 .860E-01
8	4 148	1 .160E+01		19 20	1 .146E		33 301	1 .830E-01
9	5 6	4 .933E+00		19 163	4 -114E		34 35	1 .146E+01
10		1 .146E+01		19 301	1 .870E		34 178	4 .114E+01
11		4 .114E+01		19 301	1 .680E		34 301	1 .860E-01
12	5 301	1 .954E-01		20 21	1 .129E		34 301	1 .830E-01
13		1 .146E+01		20 164	4 .114E		35 36	1 .146E+01
14		4 .114E+01		20 301	1 .870E		35 179	4 .114E+01
15		1 .940E-01		20 301	1 .490E		35 301	1 .860E-01
16		1 .146E+01		21 22	1 .115E		35 301	1 .820E-01
		4 .114E+01		21 165	4 .144E		36 37	1 .146E+01
17	7 301	1 .920E-01		21 301	1 .940E		36 180	4 .114E+01
18	7 301	1 .240E-01		22 23	1 .115E		36 301	1 .860E-01
19	8 9	1 .146E+01		22 166	4 .144E		36 301	1 .810E-01
20	8 152	4 .114E+01		22 301	1 .770E		37 38	1 .146E+01
21	8 301	1 .910E-01		23 24	1 .115E		37 181	4 .114E+01
22	8 301	1 .490E-01		23 167	4 .144E		37 301	1 .850E-01
23	9 10	1 .146E+01		23 301	1 .420E		37 301	1 .800E-01
24	9 153	4 .114E+01		24 25	1 .115E		38 39	1 .146E+01
25	9 301	1 .890E-01		24 168	4 .144E	+01 137	38 182	4 .114E+01
26	9 301	1 .680E-01		24 301	1 .136E		38 301	1 .850E-01
27	10 11	1 .146E+01	83	24 301	1 .220E	-01 139	38 301	1 .780E-01
28	10 154	4 .114E+01		25 26	1 .115E		39 40	1 -146E+01
29	10 301	1 .880E-01	85	25 169	4 .144E	+01 141	39 183	4 .114E+01
30	10 301	1 .820E-01		25 301	1 .117E	+00 142	39 301	1 .850E-01
31	11 12	1 .146E+01	87	25 301	1 .640E	-01 143	39 301	1 .770E-01
32	11 155	4 .114E+01		26 27	1 .129E	+01 144	40 41	1 .146E+01
33	11 301	1 .870E-01	89	26 170	4 .144E	+01 145	40 184	4 .114E+01
34	11 301	1 .910E-01	90	26 301	1 .101E	+00 146	40 301	1 .850E-01
. 35	12 13	1 .146E+01	91	26 301	1 .850E	-01 147	40 301	1 .750E-01
36	12 156	4 .114E+01		27 28	1 .146E	+01 148	41 42	1 .146E+01
37	12 301	1 .860E-01	93	27 171	4 .114E	+01 149	41 185	4 .114E+01
38	12 301	1 .970E-01		27 301	1 .890E	-01 150	41 301	1 .850E-01
39	13 14	1 .146E+01	95	27 301	1 .810E	-01 151	41 301	1 .730E-01
40	13 157	4 .114E+01	96	28 29	1 .146E	+01 152	42 43	1 .129E+01
41	13 301	1 .850E-01	97	28 172	4 .114E	+01 153	42 186	4 .114E+01
42	13 301	1 .100E+00	98	28 301	1 .880E	-01 154	42 301	1 .850E-01
43	14 15	1 .146E+01	99	28 301	1 .810E	-01 155	42 301	1 .710E-01
44	14 158	4 .114E+01	100	29 30	1 .146E	+01 156	43 44	1 .115E+01
45	14 301	1 .850E-01	101	29 173	4 .114E	+01 157	43 187	4 .144E+01
46	14 301	1 .101E+00	102	29 301	1 .870E		43 301	1 .910E-01
47	15 16	1 .146E+01	103	29 301	1 .820E	-01 159	43 301	1 .124E+00
48	15 159	4 .114E+01	104	30 31	1 .146E		44 45	1 .115E+01
49	15 301	1 .850E-01		30 174	4 .114E		44 188	4 .144E+01
50	15 301	1 .100E+00	106	30 301	1 .870E		44 301	1 .730E-01
51	16 17	1 .146E+01		30 301	1 .830E		44 301	1 .920E-01
52	16 160	4 .114E+01	108	31 32	1 .146E			1 .115E+01
53	16 301	1 .850E-01		31 175	4 -114E		45 189	4 .144E+01
54	16 301	1 .970E-01		31 301	1 .870E			1 .390E-01

55 17 18 1 .146E+01 111 31 301 1 .830E-01 167 46 47 1 .115E+01 56 17 161 4 .114E+01 112 32 33 1 .146E+01 168 46 190 4 .144E+01

	From To	Tac	Conduct	Brnh	Fr	on To	Tag	Conduct	Brnh	Fr	от То	Tac	Conduc	**
169	46 301	1	.150E+00	225	60	301	1	.860E-01	281	74	301		.138E+0	
170	46 301	1	.250E-01	226	60	301	1	.810E-01	282	74	301	1	.700E-0	
171	47 48	1	.115E+01	227	61	62	1	.146E+01	283	75	76	î	.120E+0	
172	47 191	4	.144E+01	228	61	205	4	-114E+01	284	75	219	â	.144E+0	
173	47 301	1	.127E+00	229	61	301	i	.860E-01	285	75	301	1	.157E+0	
174	47 301	ī	.690E-01	230	61	301	î	.810E-01	286	75	301	1	.900E=0	
175	48 49	1	.129E+01	231	62	63		.146E+01	287	76	77	i	.125E+0	
176	48 192	ã	.144E+01	232	62	206		.114E+01	288	76	220	4	.125E+0	
177	48 301	ī	.100E+00	233	62	301		.860E-01	289	76	301			
178	48 301	î	.890E-01	234	62	301		.810E-01	290	76	301	1	.171E+0	
179	49 50	î	.146E+01	235	63	64		.146E+01	291	77	78		.980E-0	
180	49 193	4	.114E+01	236	63	207		.114E+01	292	77	221	1	.210E+0	
181	49 301	ĩ	.880E-01	237	63	301		.860E-01	292	77	301	4	.106E+0	
182	49 301	î	.830E-01	238	63	301		.800E-01	294	77		1	.172E+0	
183	50 51	î	.146E+01	239	64	65					301	1	.970E-0	
184	50 194	4	.114E+01	240	64	208		.108E+01	295	78	79	1	.172E+0	
185	50 301	ī	.870E-01						296	78	222	4	.878E+0	
186	50 301	î	.830E-01	241	64	301		.860E-01	297	78	301	1	.124E+0	
187	51 52	i		242	64	301		.790E-01	298	78	301	1	.910E-0	
188	51 195		.146E+01	243	65	66		.992E+00	299	79	80	1	.992E+0	
189		4	.114E+01	244	65	209		.160E+01	300	79	223	4	.132E+0	
190		1	.870E-01	245	65	301		.940E-01	301	79	301	1	.108E+0	
		1	.830E-01	246	65	301		.870E-01	302	79	301	1	.870E-0	
191	52 53	1	.146E+01	247	66	67		.172E+01	303	80	81	1	.108E+0	
192	52 196	4	.114E+01	248	66	210		.132E+01	304	80	224	4	.160E+0	
193	52 301	1	.870E-01	249	66	301		.930E-01	305	80	301	1	.930E-0	1
194	52 301	1	.830E-01	250	66	301		.103E+00	306		301	1	.910E-0	1
195	53 54	1	.146E+01	251	67	68		.210E+01	307	81	82	1	.146E+0	1
196	53 197	4	.114E+01	252	67	211		.878E+00	308	81	225	4	.114E+0	1
197	53 301	1	.870E-01	253	67	301		.930E-01	309	81	301	1	.840E-0	11
198	53 301	1	.830E-01	254	67	301		.125E+00	310	81	301	1	.830E-0	1
199	54 55	1	.146E+01	255	68	69		.125E+01	311	82	83	1	.146E+0	1
200	54 198	4	.114E+01	256	68	212		.106E+01	312	82	226	4	.114E+0	1
201	54 301	1	.870E-01	257	68	301		.990E-01	313	82	301	1	.850E-0	1
202	54 301	1	.830E-01	258	68	301		.172E+00	314	82	301	1	.820E-0	1
203	55 56	1	.146E+01	259	69	70	1	.120E+01	315	83	84	1	.146E+0	1
204	55 199	4	.114E+01	260	69	213	4	.106E+01	316	83	227	4	.114E+0	1
205	55 301	1	.870E-01	261	69	301		.990E-01	317	83	301	1	.850E-0	
206	55 301	1	.830E-01	262	69	301		.171E+00	318	83	301	1	.820E-0	1
207	56 57	1	.146E+01	263	70	71		.115E+01	319	84	85	1	.146E+0	1
208	56 200	4	.114E+01	264	70	214		.144E+01	320	84	228	4	.114E+0	1
209	56 301	1	.870E-01	265	70	301		.900E-01	321	84	301	1	.860E-0	1
210	56 301	1	.820E-01	266	70	301		.157E+00	322	84	301	1	.820E-0	1
211	57 58	1	.146E+01	267	71	72		.115E+01	323	85	86	1	.146E+0	1
212	57 201	4	.114E+01	268	71	215	4	.144E+01	324	85	229	4	.114E+0	1
213	57 301	1	.860E-01	269	71	301		.710E-01	325	85	301	1	.860E-0	1
214	57 301	1	.820E-01	270	71	301	1	.138E+00	326	85	301	1	.820E-0	1
215	58 59	1	.146E+01	271	72	73		.115E+01	327	86	87	1	.146E+0	1
216	58 202	4	.114E+01	272	72	216	4	.144E+01	328	86	230	4	.114E+0	1
217	58 301	1	.860E-01	273	72	301	1	.330E-01	329	86	301	1	.860E-0	1
218	58 301	1	.820E-01	274	72	301	1	.670E-01	330	86	301	1	.820E-0	1
219	59 60	1	.146E+01	275	73	74	1	.115E+01	331	87	88	1	.146E+0	1
220	59 203	4	.114E+01	276	73	217	4	.144E+01	332	87	231	4	.114E+0	1
221	59 301	1	.860E-01	277	73	301	1	.670E-01	333	87	301	1	.860E-0	1
222	59 301	1	.820E-01	278	73	301	1	.310E-01	334	87	301	1	.820E-0	1
223	60 61	1	.146E+01	279	74	75	1	.115E+01	335	88	89	1	.146E+0	1
224	60 204	4	.114E+01	280	74	218	4	.144E+01	336	88	232	4	.114E+0	1

		Tag Conduct		duct
337	88 301	1 .850E-01	393 102 301 1 .900E-01 449 116 301 1 .830	E-01
338	88 301	1 .820E-01	394 103 104 1 .146E+01 450 117 118 1 .146	E+01
339	89 90	1 .146E+01		E+01
340	89 233	4 .114E+01		E-01
341	89 301	1 .850E-01		E-01
342	89 301	1 .810E-01		E+01
343	90 91	1 .146E+01		
344	90 234	4 .114E+01		E+01
345	90 301	1 .850E-01		
346	90 301	1 .810E-01		
347	91 92	1 .146E+01		
348	91 235	4 .114E+01	403 105 249 4 .114E+01 459 119 263 4 .144 404 105 301 1 .790E-01 460 119 301 1 860	
349	91 301			
350		1 .850E-01	405 105 301 1 .830E-01 461 119 301 1 .960	E-01
	91 301	1 .810E-01	406 106 107 1 .146E+01 462 120 121 1 .115	E+01
351	92 93	1 .146E+01	407 106 250 4 .114E+01 463 120 264 4 .144	E+01
352	92 236	4 .114E+01	408 106 301 1 .810E-01 464 120 301 1 .650	E-01
353	92 301	1 .850E-01		E+00
354	92 301	1 .810E-01	410 107 108 1 .146E+01 466 121 122 1 .115	
355	93 94	1 .146E+01	411 107 251 4 .114E+01 467 121 265 4 .144	
356	93 237	4 .114E+01	412 107 301 1 .820E-01 468 121 301 1 .220	
357	93 301	1 .850E-01	413 107 301 1 .830E-01 469 121 301 1 .133	
358	93 301	1 .810E-01	414 108 109 1 .146E+01 470 122 123 1 .115	
359	94 95	1 .146E+01	415 108 252 4 -114E+01 471 122 266 4 .144	
360	94 238	4 .114E+01		
361	94 301	1 .850E-01		
362	94 301	1 .810E-01		
363	95 96	1 .146E+01		
364	95 239	4 .114E+01		
365	95 301			
			421 109 301 1 .830E-01 477 124 268 4 .144	
366	95 301	1 .810E-01	422 110 111 1 .146E+01 478 124 301 1 .940	
367	96 97	1 .129E+01	423 110 254 4 .114E+01 479 125 126 1 .146	E+01
368	96 240	4 .114E+01	424 110 301 1 .850E-01 480 125 269 4 .114	E+01
369	96 301	1 .840E-01	425 110 301 1 .830E-01 481 125 301 1 .490	E-01
370	96 301	1 .800E-01	426 111 112 1 .146E+01 482 125 301 1 .860	E-01
371	97 98	1 .115E+01	427 111 255 4 .114E+01 483 126 127 1 .146	E+01
372	97 241	4 .144E+01	428 111 301 1 .850E-01 484 126 270 4 .114	
373	97 301	1 .900E-01	429 111 301 1 .830E-01 485 126 301 1 .680	
374	97 301	1 .930E-01	430 112 113 1 .146E+01 486 126 301 1 .860	
375	98 99	1 .115E+01	431 112 256 4 .114E+01 487 127 128 1 .146	
376	98 242	4 .144E+01	432 112 301 1 .850E-01 488 127 271 4 .114	
377	98 301	1 .690E-01	433 112 301 1 .830E-01 489 127 301 1 .820	
378	98 301	1 .123E+00	434 113 114 1 .146E+01 490 127 301 1 .850	
379	99 100	1 .115E+01		
380	99 243	4 .144E+01		
381	99 301		437 113 301 1 .830E-01 493 128 301 1 .910	
382	99 301	1 .149E+00	438 114 115 1 .146E+01 494 128 301 1 .840	
	100 101	1 .115E+01	439 114 258 4 .114E+01 495 129 130 1 .146	
	100 244	4 .144E+01	440 114 301 1 .850E-01 496 129 273 4 .114	
	100 301	1 .380E-01	441 114 301 1 .830E-01 497 129 301 1 .970	
	101 102	1 .115E+01	442 115 116 1 .146E+01 498 129 301 1 .830	E-01
	101 245	4 .144E+01	443 115 259 4 .114E+01 499 130 131 1 .146	E+01
388	101 301	1 .920E-01	444 115 301 1 .840E-01 500 130 274 4 .114	E+01
389 1	101 301	1 .720E-01		E+00
390 1	102 103	1 .129E+01		E-01
	102 246	4 .144E+01		E+01
	102 301	1 .124E+00		E+01

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500 132 276		1 .830E-01	562 159 158	5 .316E+03	618 215 214	
508 132 276 4 .114E-01 564 161 160 5 .316E-03 620 217 216 5 .116E-03 132 019 132 019 1 .100E-03 056 162 161 3 .316E-03 03 .116E-03 (22) 121 121 5 .116E-03 132 019 019 019 019 019 019 019 019 019 019		1 .146E+01	563 160 159	5 .316E+03	619 216 215	5 .316E+03
909 132 301 1 .100F-00 565 161 62 5 .116F-00 62 212 217 5 .116F-00 11 131 301 1 .100F-00 565 161 62 5 .116F-00 62 11 140 140 140 140 140 140 140 140 140	508 132 276	4 .114E+01	564 161 160	5 .316E+03		
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511 131 314	510 132 301					
912 133 277 4 .1148-01 550 165 184 5 .1168-03 624 221 220 5 .1168-03 131 131 131 13 .7788-01 1 .7978-01 501 166 165 5 .1168-03 625 222 221 5 .1168-03 131 131 131 13 1 .1468-01 571 166 167 5 .1168-03 627 224 221 5 .1168-03 131 131 131 131 1 .1468-01 571 166 167 5 .1168-03 627 224 221 5 .1168-03 131 131 131 131 131 131 131 131 131 1						
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518 134 201 1 .4687-01 570 172 173 1 .5 .11687-01 613 223 272 5 .11687-01 619 135 135 2 .5 .11687-01 619 135 135 2 .5 .11687-01 619 135 135 2 .5 .11687-01 619 135 135 2 .5 .11687-01 619 135 135 2 .5 .11687-01 619 135 2 .5 .11687-						
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521 135 301 1 .205-01 577 174 173 5 .3165-03 63 220 229 5 .3165-03 622 135 307 1 .405-01 777 175 174 5 .3165-03 63 220 229 5 .3165-03 63 220 229 5 .3165-03 63 220 229 5 .3165-03 63 220 239 5 .3165-0						
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523 116 117						5 .316E+03
524 136 280 4 .1148-01 880 177 176 5 .2168-03 676 221 222 5 .1168-03 672 136 230 124 231 6 230 1 .1668-03 181 781 777 23 .1168-03 181 781 777 23 .1168-03 181 781 77 23 .1168-03 181 781 77 23 .1168-03 181 781 77 23 .1168-03 181 781 77 23 .1168-03 181 781 77 23 .1168-03 181 781 781 781 781 781 781 781 781 781						5 .316E+03
525 136 201 1 . 6808-01 581 78 177 5 . 3156-03 677 224 223 5 . 3156-03 5 . 315					635 232 231	5 .316E+03
526 116 001 1 .000-01 582 179 178 5 .316E-03 69 225 215 5 .316E-03 277 137 138 1 18 1.46E-01 581 100 179 5 .316E-03 69 226 225 5 .316E-03 277 137 138 1 1 .46E-01 581 100 179 5 .316E-03 69 226 225 5 .316E-03 282 137 281 4 .114E-01 584 181 100 5 .316E-03 60 20 225 25 5 .316E-03 282 137 281 4 .114E-01 584 181 100 5 .316E-03 60 20 225 25 5 .316E-03 281 281 281 281 281 281 281 281 281 281			580 177 176	5 .316E+03	636 233 232	5 .316E+03
526 118 201 1 .860F-01 582 179 178 5 .316F-03 638 235 214 5 .116F-03 722 177 231 178 2		1 .680E-01	581 178 177	5 .316E+03	637 234 233	5 .316E+03
527 137 138 1 .1468-01 880 180 179 5 .3168-03 69 236 235 5 .1168-03 129 137 238 4 .1168-01 880 181 180 5 .3168-03 60 60 237 236 5 .1168-03 139 139 139 139 139 139 139 139 139 13		1 .860E-01	582 179 178	5 .316E+03	638 235 234	
528 137 281 4 .114E-01 581 281 180 5 .316E-03 60 227 236 5 .106E-03 720 137 201 1 .4092-01 585 182 181 5 .316E-03 61 232 275 5 .106E-03 720 137 201 1 .4092-01 585 182 181 5 .316E-03 61 232 275 5 .106E-03 720 137 281 181 191 1 .146E-01 587 184 183 5 .116E-03 64 242 240 5 .316E-03 720 138 139 1 .146E-01 589 184 185 5 .116E-03 64 242 240 5 .316E-03 720 138 139 1 .146E-01 589 184 185 5 .116E-03 64 242 240 5 .316E-03 61 240 240 240 240 240 5 .316E-03 61 240 240 240 240 240 240 240 240 240 240	527 137 138	1 .146E+01	583 180 179			
529 177 701 1 .409C-01 585 182 181 5 .216E-03 641 228 277 5 .116E-03 103 177 701 1 .409C-01 586 182 182 5 .116E-03 642 277 5 .116E-03 61 278 277 5 .116E-03 61 278 278 278 278 278 278 278 278 278 278	528 137 281	4 .114E+01				
530 137 301 1 .4078-01 856 181 182 5 .3166-03 642 239 239 5 .1166-03 131 181 135 1 .4648-01 871 184 184 5 .3168-03 642 239 239 5 .1168-03 131 181 181 1 .4648-01 871 184 184 5 .3168-03 642 642 642 642 642 643 643 643 643 643 643 643 643 643 643		1 .490E-01				
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522 138 282 4 .1148-01 589 18- 184 5 .3168-03 644 201 20 5 .3168-03 131 310 31 1 .2408-01 589 18- 185 5 .3168-03 18- 18- 18- 18- 18- 18- 18- 18- 18- 18-	531 138 139					
531 188 301 1 .240F-01 889 186 185 5 .315EP-03 645 242 241 5 .315EP-03 741 189 201 1 .880F-01 390 187 186 5 .315EP-03 646 242 242 5 .315EP-03 741 189 243 1 .880F-01 390 187 186 5 .315EP-03 646 242 242 5 .315EP-03 741 189 243 1 .415EP-01 489 245 245 245 245 245 245 245 245 245 245						
534 138 001 1 .880-01 590 187 186 5 .3165-03 646 243 242 5 .3165-03 193 193 103 137 203 139 140 1 .1465-01 591 188 187 5 .3165-03 164 243 242 5 .3165-03 163 203 139 140 140 140 140 140 140 140 140 140 140						
535 139 140 1 1.44E-01 991 188 187 5 .31EE-03 647 244 243 5 .31EE-03 183 139 240 1 1.44E-01 183 188 188 5 .31EE-03 183 188 188 5 .31EE-03 183 188 188 189 5 .31EE-03 183 188 188 189 189 189 189 189 189 189 189						
536 139 283 4 .1148-01 992 199 188 5 .3156-03 648 243 244 5 .3156-03 77 139 201 1 .5002-01 393 190 189 5 .3156-03 648 243 244 5 .3156-03 77 139 201 1 .5002-01 393 190 189 5 .3156-03 609 246 246 5 .3156-03 190 190 190 190 190 190 190 190 190 190						
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538 140 141 1.1650-01 590 191 190 5.3155-03 800 247 246 5.3155-03 190 140 244 4.1145-01 590 192 130 1.3155-03 1.3155-03 1.324 247 5.3155-03 1.3255						
599 10 284 4 .1148-01 999 192 191 5 .3168-03 691 248 277 5 .3168-03 691 400 201 1 .9108-01 596 193 192 5 .3168-03 695 240 240 5 .3168-03 695 193 192 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 5 .3168-03 695 240 240 240 240 240 240 240 240 240 240						
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542 141 285 4 .93128-00 998 199 194 5 .31658-03 654 221 220 5 .31658-03 654 124 240 5 .31658-03 654 124 240 5 .31658-03 654 220 255 5 .31658-03 654 124 240 5 .31658-03 654 251 255 5 .31658-03 654 25		1 .910E-01				
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544 142 286 4 .0318-00 000 197 196 5 .3168-00 197 232 252 2 5 .1168-00 1 000 197 196 5 .3168-00 197 242 252 5 .1168-00 198 197 24 197 2						
545 143 144 1 .1788-01 601 198 197 5 .3168-03 687 254 553 5 .3168-03 67 64 132 87 4 .53128-00 602 199 188 5 .3168-03 687 254 555 5 .3168-03 67 64 132 87 4 .53128-00 602 199 188 5 .3168-03 689 255 555 5 .3168-03 67 67 67 67 67 67 67 67 67 67 67 67 67					655 252 251	5 .316E+03
546 141 287 4 .93128-00 602 199 198 5 .3165703 658 225 254 5 .3165703 74 144 288 4 .93128-00 602 199 198 5 .3165703 658 225 255 5 .1165703 658 145 302 5 .3165703 604 201 200 5 .3165703 660 257 256 5 .3165703 604 201 200 5 .3165703 660 257 256 5 .3165703 605 201 201 5 .3165703 660 257 256 5 .3165703 605 201 201 5 .3165703 660 257 256 5 .3165703 605 201 201 5 .3165703 660 257 258 5 .3165703 650 257 258 6 5 .3165703 605 201 201 201 201 201 201 201 201 201 201			600 197 196	5 .316E+03	656 253 252	5 .316E+03
547 144 288 4 .9318-00 607 200 199 5 .1168-03 699 226 525 5 .1168-03 684 145 705 5 .1168-03 604 201 200 5 .1168-03 606 227 526 5 .1168-03 684 145 705 5 .1168-03 604 201 200 5 .1168-03 606 227 526 5 .1168-03 695 201 201 201 201 201 201 201 201 201 201			601 198 197	5 .316E+03	657 254 253	5 .316E+03
547 144 288 4 -93128-00 607 200 199 5 .1168-03 659 226 255 5 .1168-03 188 144 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 503 5 .1168-03 608 145 5 .1		4 .933E+00	602 199 198	5 .316E+03	658 255 254	5 .316E+03
549 146 145 5 .1168+03 605 202 201 5 .1168+03 661 228 277 5 .1168+03 550 147 146 5 .1168+03 606 203 202 5 .1168+03 662 229 258 5 .1168+03 550 147 146 5 .1168+03 607 204 203 5 .1168+03 603 206 229 5 5 .1168+03 552 149 148 5 .1168+03 609 205 204 5 .1168+03 603 206 229 5 5 .1168+03 603 206 229 5 5 .1168+03 603 206 205 204 5 .1168+03 603 206 205 204 5 .1168+03 605 205 204 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 205 5 .1168+03 605 205 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 5 .1168+03 605 205 205 205 5 .1168+03 605 205 205 205 5 .1168+03 605 205 205 205 205 205 205 205 205 205 2				5 .316E+03	659 256 255	
549 146 145 5 .1168+03 605 202 201 5 .1168+03 661 258 257 5 .1168+03 550 147 146 5 .1168+03 606 203 202 5 .1168+03 662 229 258 5 .1168+03 550 147 146 5 .1168+03 607 204 203 5 .1168+03 663 260 259 5 .1168+03 552 149 148 5 .1168+03 609 205 204 5 .1168+03 663 260 259 5 .1168+03 552 149 148 5 .1168+03 609 205 204 5 .1168+03 664 261 260 5 .1168+03 553 150 149 5 .1168+03 609 205 205 5 .1168+03 665 262 261 5 .1168+03 544 151 150 5 .1168+03 61 207 206 5 .1168+03 66 261 262 5 .1168+03 61 207 206 5 .1168+03 61			604 201 200	5 .316E+03	660 257 256	5 .316E+03
550 147 146 5 .316E+03 606 203 202 5 .316E+03 606 229 258 5 .316E+03 531 148 147 5 .316E+03 607 204 205 5 .316E+03 607		5 .316E+03	605 202 201	5 .316E+03		
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556 153 152 5 .316E+03 612 209 208 5 .316E+03 668 265 264 5 .316E+03						
557 154 153 5 .316E+03 613 210 209 5 .316E+03 669 266 265 5 .316E+03 558 155 154 5 .316E+03 614 211 210 5 .316E+03 670 267 266 5 .316E+03						
560 157 156 5 .316E+03 616 213 212 5 .316E+03 672 269 268 5 .316E+03	300 13/ 136	J .J10E+U3	010 513 515	2 .2TPE+03	072 269 268	5 .316E+03

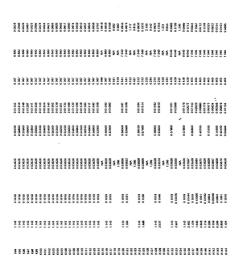
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			Tag Conduct
673	270	269	5 .316E+03
674	271	270	5 .316E+03
675	272	271	5 .316E+03
676	273	272	5 .316E+03
677	274	273	5 .316E+03
678	275	274	5 .316E+03
679	276	275	5 .316E+03
680	277	276	5 .316E+03
681	278	277	5 .316E+03
682	279	278	5 .316E+03
683	280	279	5 .316E+03
684	281	280	5 .316E+03
685	282	281	5 .316E+03
686	283	282	5 .316E+03
687	284	283	5 .316E+03
688	285	284	5 .316E+03
689	286	285	
690	287	286	5 .316E+03
691	288	287	5 .316E+03

TASS GENERAL INPUT MENU - SI Units

	Case Title: RUN 5. COMPLEX MODEL, MASS FLOW O	P 362.9	kg/hr	(800	lbm/hr)
(2)	Nodes	288			
(3)	Constant Temperatures	2			
(4)	Unique Exponents	0			
(5)	Temperature Dependent Conductances	0			
(6)	Temperature Dependent Heat Inputs	0			
. (7)	Computational Accuracy	.0100			
(8)	Starting Temperature	25.0			
Are	these inputs correct (Y/N) ? Y				

Section 2	Fin Daksman	Physical College (c)	Physicaling (c) Decrease Conducting of Copput (p) to produce Present Hundon	Playings Numbe	Pennill Hutthe	Outst pipe discission	hand plys distuded	Pas Ass.
6316	100	2000	7 10 1	90 0001	752.0	909	13	120
K-Vaha	Charles What Da	Charmel Whate St. Effective December	Heat Standar Conficers 63	4	ļ	that beforest flades	Faminos	K. Value
	freed	res)	(A residental)	-	Christ	(Comp		(Mile)
			1			0.00	404	17784
2			2 000			200.0	ź	2
2			187			****	484	300
ž			ž			74.0	***	1 4612
2			2 060			795.0	444	1.4240
2	31	9191.0	0.03626	00000	001333	795.0	2000	10000
2	21.1	91919	0.03020	0.60000	111100	686.0	900	20000
2	911	220	0.03628	0.60200	0 01201	198 0	0000	0 0024
2	-	0 0000	\$2700		2077000	197.0	0000	0.6241
N 10	21.	21210	6.03624	00000	0.01200	195 0	0000	10000
118	0.266	90000	C COMPANY		0 00050	0.367	0 000	0.0492
K12	21.	0.010	0.03628	001290	0.01245	190 9	0.000	0.0000
KIS	0414	97800	6.03613		0.0003	/90 0	9 860	0.0002
K14		0.101.0	907000	0.00000	97710 0	0.367	0.000	9/800
A16	0 631	0.0000	99 200 0		2000	6367	0.000	91950
A16	2	2010	979600	0 00000	0.01210	636	9 900	0.000
K17	0.00	0 0002	917000		001271	200	900	1000
K 16	21.	0.101.0	879CD 0	0.69000	3100	700.0	2	0 0000
e X	1090	00000	0.03548		001700	0 367	9000	85000
27	31.	91010	0.03628	0.66400	901109	197.0	9 000	40000
ā	9170	0 0000	0.00000		99100	200	700 4	9010
27	2	0.1010	0.0000	00100	001100	100	200 0	2010
2	0.732	0.000	0.03606		0014100	170	200 0	1010
24	2	9 9	0.0000	0 66100	1000	750	900	01000
2	21.	2	97700	3		2	200	00000
97	2	9	97700	0.000	2	200	200	00000
2	2	2 0	979000		9	200	* 600	0.0000
2	3	2	979670 0		10000	1000	•	0 0000
974			× Z				V.	1007
92	2	91010	0.03628	0 075700	91710	0 367	9 900	6 (8/2
ź			ž			994 0	× 2	1524
~			2 000			9 460	*	1000
2	100	0.1010	679076	0.00000	201100	0.445	947	11600
ž	0.000	0.1601	5,65670	6 44000	0.60468	999	250	2700
538	947.0	-	0.03600	0.20300	0.00130	0.000	1 640	01000
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72	0.200	0.0904	82,600.0	000000	107000	999-0	9197	00230
ć	1.490	0.1030	0.03600	0.62290	00100	0.403	7	5110
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00190	901100	0.000	200	3	00000	0.0000	0 Sector	0.0000	0.04000	0.56200	0.59200	0.68234	0.0000	0.04000	0.6460	0.0000	0,000	1000	2000		0,000	0.00	0.000	100.00	00700	2000	0 00000	0.30000	0.46100	09/40	0.47500	0.01/000	00100	0.60/889		0.41000		0.18300	1 46930	9	0.00000	0 34400	0.04000	0.04540	0.00000	0 20000	000000	0 66600	0.00000	0.65300	0.0000	0.564500	4 3 600
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100	-	61010	20,000	31979	601100	74.0	9000	-
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	5	3	4		.178E+01	61	18	301	1		0E-01	117	33	177		.701E+00
	6	3	147		.576E+00	62	18	301	1	.82	0E-01	118	33	301		.860E-01
	7	4	5		.160E+01	63	19	20	1	.14	6E+01	119	33	301		.830E-01
	8	4	148		.576E+00	64		163	4	.70	1E+00	120	34	35		.146E+01
	9	5	6		.146E+01	65	19	301	1	.87	0E-01	121	34	178		.701E+00
	10	5	149	4	.701E+00	66	19	301	1	-68	0E-01	122	34	301		.860E-01
	11	5	301	1	.954E-01	67	20	21	1	.12	9E+01	123	34	301		.830E-01
	12	6	7		.146E+01	68	20	164	4		LE+00	124	35	36		.146E+01
	13	6	150		.701E+00	69	20	301	1	.87	0E-01	125	35	179		.701E+00
	14	6	301	1	.940E-01	70	20	301	1	. 49	DE-01	126	35	301		.860E-01
	15	7	8	1	.146E+01	71	21	22	1		5E+01	127	35	301		.820E-01
	16	7	151	4	.701E+00	72	21	165	4		9E+00	128	36	37		
	17	7	301	1	.920E-01	73	21	301	1		0E-01	129	36	180		.146E+01
	18	7	301		.240E-01	74	22	23	î		5E+01	130	36	301		.701E+00
	19	8	9		.146E+01	75	22	166	4		9E+00	131	36	301		.860E-01
	20	8	152		.701E+00	76	22	301	1		0E-01	132	37	301		.810E-01
	21	8	301		.910E-01	77	23	24	î		5E+01	133				.146E+01
	22	8	301	ī	.490E-01	78	23	167	â		9E+00	134	37	181		.701E+00
	23	9	10		.146E+01	79	23	301	1		0E-01		37	301		.850E-01
	24	9	153		.701E+00	80	24	25			5E+01	135	37	301		.800E-01
	25	9	301		.890E-01	81	24	168	4			136	38	39		.146E+01
	26	9	301		.680E-01	82	24	301	ĩ		9E+00	137	38	182		.701E+00
		10	11		.146E+01	83					5E+00	138	38	301		.850E-01
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		10	301		.880E-01				1		5E+01	140	39	40		.146E+01
		10	301		.820E-01	85	25	169	4		9E+00	141		183		.701E+00
		11	12			86	25	301	1		7E+00	142	39	301	1	.850E-01
			155		.146E+01	87	25	301	1		DE-01	143	39	301		.770E-01
		11	301			88	26	27	1		9E+01	144	40	41	1	.146E+01
					.870E-01	89	26	170	4		9E+00	145		184	4	.701E+00
		11	301		.910E-01	90	26	301	1		1E+00	146	40	301	1	.850E-01
		12	13		.146E+01	91	26	301	1		DE-01	147		301	1	.750E-01
			156		.701E+00	92	27	28	1		5E+01	148	41	42	1	.146E+01
		12	301		.860E-01	93	27	171	4	.70	1E+00	149	41	185	4	.701E+00
		12	301		.970E-01	94	27	301	1		DE-01	150	41	301		.850E-01
		13	14		.146E+01	95	27	301	1		DE-01	151	41	301	1	.730E-01
		13	157		.701E+00	96	28	29	1	-14	6E+01	152	42	43		.129E+01
		13	301	1	.850E-01	97	28	172	4		1E+00	153	42	186		.701E+00
		13	301		.100E+00	98	28	301	1	.88	0E-01	154	42	301		.850E-01
		14	15		.146E+01	99	28	301	1	.81	DE-01	155	42	301		.710E-01
			158	4	.701E+00	100	29	30	1	-14	6E+01	156	43	44		.115E+01
		14	301	1	.850E-01	101	29	173	4	.70	1E+00	157	43	187		.889E+00
		14	301	1	.101E+00	102	29	301	1	.87	0E-01	158	43	301		.910E-01
		15	16		.146E+01	103	29	301	1		0E-01	159	43	301		.124E+00
			159	4	.701E+00	104	30	31	1		6E+01	160	44	45		.115E+01
		15	301	1	.850E-01	105	30	174	4		1E+00	161	44	188		.889E+00
		15	301	1	.100E+00	106	30		1		0E-01	162	44	301		.730E-01
	51	16	17	1	.146E+01	107	30		î		0E-01	163	44	301		.920E-01
	52	16	160		.701E+00	108	31	32	1		6E+01	164	45	46		.920E-01
- 3		16	301		.850E-01	109		175	4		1E+00	165	45	189		.115E+01
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171 4 172 4 1173 4 1174 4 1175 4 1176 4 1177 4 1181 4 1182 4 1183 5 1183 5 1184 5 1185 5 1187 5 1189 5 1189 5 1191 5 1191 5 1191 5 1194 5 1195 5 1196 5 1197 5 1198 5	7 48 7 191 7 301 8 492 8 301 8 192 8 301 9 50 9 193 9 301 0 51 0 301 0 194 0 301 1 195 1 301 1 301 1 301 1 301 2 53 2 196 2 301	1 4 1 1 1 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1	.115E+01 .889E+00 .127E+00 .690E-01 .129E+01 .889E+00 .100E+00 .890E-01 .146E+01 .701E+00 .830E-01 .146E+01 .701E+00 .870E-01 .830E-01 .830E-01 .146E+01 .701E+00 .870E-01	227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242	61 61 62 62 62 63 63 63 64 64 64	62 205 301 301 63 206 301 301 64 207 301 301 65 208	1 1 1 1 1 1 1 1 1 1 1	.146E+01 .701E+00 .860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .810E-01 .701E+00 .860E-01 .800E-01 .800E-01	283 284 285 286 287 288 289 290 291 292 293 294	75 75 75 76 76 76 76 77 77	76 219 301 301 77 220 301 301 78 221 301 301	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	.700E-0 .120E+0 .889E+0 .157E+0 .900E-0 .125E+0 .655E+0 .171E+0 .980E-0 .210E+0 .655E+0 .172E+0 .970E-0
172 4 173 4 174 4 175 4 176 4 177 4 177 4 178 4 179 4 181 4 181 4 181 4 181 5 181 5 188 5 188 5 189 5 191 5 190 5 191 5 193 5 194 5 195 5 196 5 197 5 198 5 199 5	7 191 7 301 7 301 8 49 8 192 8 301 9 50 9 193 9 301 0 194 0 301 1 52 1 195 1 301 2 53 2 196 2 301	41114111411141111	.889E+00 .127E+00 .690E-01 .129E+01 .889E+00 .100E+00 .890E-01 .146E+01 .701E+00 .880E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	228 229 230 231 232 233 234 235 236 237 238 239 240 241 242	61 61 62 62 62 63 63 63 64 64 64	205 301 301 63 206 301 301 64 207 301 301 65 208	4 1 1 1 1 1 1 1 1 1	.701E+00 .860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .146E+01 .701E+00 .860E-01 .800E-01 .108E+01	284 285 286 287 288 289 290 291 292 293 294	75 75 76 76 76 76 77 77 77	219 301 301 77 220 301 301 78 221 301 301	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	.120E+0 .889E+0 .157E+0 .900E-0 .125E+0 .171E+0 .980E-0 .210E+0 .655E+0 .172E+0
173 4 174 4 1175 4 1176 4 1177 4 1178 4 1179 4 1180 4 1181 4 1182 5 1183 5 1184 5 1185 5 1187 5 1189 5 1191 5 1192 5 1193 5 1194 5 1195 5 1196 5 1197 5 1198 5 1199 5	7 301 7 301 8 49 8 192 8 301 9 50 9 193 9 301 0 51 0 194 0 301 1 52 1 195 1 301 2 53 2 301	111111111111111111111111111111111111111	.127E+00 .690E-01 .129E+01 .889E+00 .100E+00 .890E-01 .701E+00 .880E-01 .830E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	229 230 231 232 233 234 235 236 237 238 239 240 241 242	61 62 62 62 63 63 63 64 64	301 301 63 206 301 301 64 207 301 301 65 208	1 1 1 1 1 1 1 1 1 1	.860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .800E-01 .108E+01	285 286 287 288 289 290 291 292 293 294	75 76 76 76 76 77 77 77	301 77 220 301 301 78 221 301 301	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	.889E+0 .157E+0 .900E-0 .125E+0 .655E+0 .171E+0 .980E-0 .210E+0 .655E+0 .172E+0 .970E-0
174 4 1175 4 1177 4 1177 4 1177 4 1178 4 1180 4 1181 4 1181 4 1181 4 1182 5 1186 5 1186 5 1188 5 1189 5 1189 5 1190 5 1191 5 119	7 301 8 49 8 492 8 301 8 301 9 50 9 193 9 301 0 51 0 194 0 301 1 52 1 195 1 301 2 53 2 196	114111411141114111	.690E-01 .129E+01 .889E+00 .100E+00 .890E-01 .146E+01 .701E+00 .880E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	230 231 232 233 234 235 236 237 238 239 240 241 242	61 62 62 62 63 63 63 64 64	301 63 206 301 301 64 207 301 301 65 208	1 1 1 1 1 1 1 1 1	.860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .800E-01 .108E+01	285 286 287 288 289 290 291 292 293 294	75 76 76 76 76 77 77 77	301 77 220 301 301 78 221 301 301	1 1 4 1 1 1 1 1 1 1	.157E+0 .900E-0 .125E+0 .655E+0 .171E+0 .980E-0 .210E+0 .655E+0 .172E+0
175 4 1176 4 1177 4 1178 4 1179 4 1180 4 1181 4 1181 5 1181 5 1182 4 1183 5 1184 5 1185 5 1185 5 1186 5 1187 5 1189 5 1190 5 1191 5 1191 5 1192 5 1193 5 1194 5 1195 5 1196 5 1197 5 1198 5 1199 5	8 49 8 192 8 301 9 50 9 193 9 301 0 51 0 301 1 52 1 301 2 53 2 196	141114111411111111111111111111111111111	.129E+01 .889E+00 .100E+00 .890E-01 .146E+01 .701E+00 .880E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .830E-01 .146E+01	231 232 233 234 235 236 237 238 239 240 241 242	62 62 62 63 63 63 64 64	301 63 206 301 301 64 207 301 301 65 208	1 1 1 1 1 1 1 1 1	.810E-01 .146E+01 .701E+00 .860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .800E-01	286 287 288 289 290 291 292 293 294	75 76 76 76 76 77 77 77	301 77 220 301 301 78 221 301 301	1 1 1 1 1 1 1 1 1 1	.900E-0 .125E+0 .655E+0 .171E+0 .980E-0 .210E+0 .655E+0 .172E+0
176 4:177 4:178 4:179 4:1179 4:1180 4:181 4:183 5:186 5:186 5:186 5:191	8 192 8 301 8 301 9 50 9 193 9 301 0 51 0 194 0 301 1 52 1 195 1 301 1 301 2 53 2 196	4 1 1 4 1 1 1 4 1 1 1 1	.889E+00 .100E+00 .890E-01 .146E+01 .701E+00 .880E-01 .830E-01 .701E+00 .870E-01 .830E-01 .830E-01 .146E+01 .701E+00	232 233 234 235 236 237 238 239 240 241 242	62 62 62 63 63 63 64 64	63 206 301 301 64 207 301 301 65 208	1 1 1 1 1 1 1 1 1	.146E+01 .701E+00 .860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .800E-01 .108E+01	287 288 289 290 291 292 293 294	76 76 76 76 77 77 77	77 220 301 301 78 221 301 301	1 1 1 1 1 1 1 1	.125E+0 .655E+0 .171E+0 .980E-0 .210E+0 .655E+0 .172E+0 .970E-0
177 4 1178 4 1179 4 1180 4 1181 4 1182 4 1183 5 1185 5 1186 5 1186 5 1187 5 1188 5 1190 5 1191 5 1191 5 1192 5 1193 5 1194 5 1195 5 1196 5 1197 5 1198 5 1199 5 1198 5 1199 5	8 301 8 301 9 50 9 193 9 301 9 301 0 51 0 301 1 52 1 301 1 301 2 53 2 196 2 301	4 1 1 4 1 1 1 4 1 1 1 1	.889E+00 .100E+00 .890E-01 .146E+01 .701E+00 .880E-01 .830E-01 .701E+00 .870E-01 .830E-01 .830E-01 .146E+01 .701E+00	232 233 234 235 236 237 238 239 240 241 242	62 62 63 63 63 64 64 64	206 301 301 64 207 301 301 65 208	1 1 1 1 1 1 1 1	.701E+00 .860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .800E-01	288 289 290 291 292 293 294	76 76 76 77 77 77	220 301 301 78 221 301 301	1 1 4 1 1	.655E+0 .171E+0 .980E-0 .210E+0 .655E+0 .172E+0
178 4: 179 4: 180 4: 181 4: 181 4: 182 4: 183 5: 184 5: 186 5: 187 5: 188 5: 189 5: 199 5: 191 5: 192 5: 193 5: 194 5: 195 5: 197 5: 198 5: 199 5: 19	8 301 8 301 9 50 9 193 9 301 0 194 0 301 0 301 1 52 1 301 1 301 2 53 2 196 2 301	1 1 4 1 1 1 4 1 1 1 1	.100E+00 .890E-01 .146E+01 .701E+00 .880E-01 .830E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	233 234 235 236 237 238 239 240 241 242	62 63 63 63 64 64 64	301 301 64 207 301 301 65 208	1 1 1 1 1 1	.860E-01 .810E-01 .146E+01 .701E+00 .860E-01 .800E-01	289 290 291 292 293 294	76 76 77 77 77 77	301 301 78 221 301 301	1 1 4 1 1	.171E+0 .980E-0 .210E+0 .655E+0 .172E+0 .970E-0
178 4: 179 4: 180 4: 181 4: 181 4: 182 4: 183 5: 184 5: 186 5: 187 5: 188 5: 189 5: 199 5: 191 5: 192 5: 193 5: 194 5: 195 5: 197 5: 198 5: 199 5: 19	8 301 9 50 9 193 9 301 0 51 0 194 0 301 0 301 1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 4 1 1 4 1 1 1 1 1	.890E-01 .146E+01 .701E+00 .880E-01 .830E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	234 235 236 237 238 239 240 241 242	62 63 63 63 64 64	301 64 207 301 301 65 208	1 4 1 1 1	.810E-01 .146E+01 .701E+00 .860E-01 .800E-01 .108E+01	290 291 292 293 294	76 77 77 77 77	301 78 221 301 301	1 4 1 1	.980E-0 .210E+0 .655E+0 .172E+0 .970E-0
179 4: 181 4: 182 4: 182 4: 182 5: 184 5: 185 5: 187 5: 187 5: 189 5: 190 5: 191 5: 192 5: 193 5: 194 5: 195 5: 197 5: 198 5: 198 5: 199 5: 19	9 50 9 193 9 301 0 51 0 301 0 301 0 301 1 52 1 195 1 301 1 301 2 53 2 301	1 1 1 1 1 1 1 1 1 1 1 1	.146E+01 .701E+00 .880E-01 .830E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	235 236 237 238 239 240 241 242	63 63 63 64 64	64 207 301 301 65 208	1 1 1	.146E+01 .701E+00 .860E-01 .800E-01	291 292 293 294	77 77 77 77	78 221 301 301	1 1 1	.210E+0 .655E+0 .172E+0 .970E-0
180 4:181 4:182 4:183 5:186 5:186 5:186 5:189 5:199 5:	9 193 9 301 9 301 0 51 0 194 0 301 0 301 1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 1 1 1 1 1 1 1 1 1	.701E+00 .880E-01 .830E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	236 237 238 239 240 241 242	63 63 64 64	207 301 301 65 208	1 1	.701E+00 .860E-01 .800E-01	292 293 294	77 77 77	221 301 301	1	.655E+0 .172E+0 .970E-0
181 4: 182 4: 183 5: 184 5: 185 5: 186 5: 187 5: 189 5: 191 5: 191 5: 194 5: 195 5: 196 5: 197 5: 198 5: 199 5: 190 5: 19	9 301 9 301 0 51 0 194 0 301 1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 1 1 1 1 1 1 1 1 1 1	.880E-01 .830E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	237 238 239 240 241 242	63 64 64 64	301 301 65 208	1	.860E-01 .800E-01 .108E+01	293 294	77 77	301 301	1	.655E+0 .172E+0 .970E-0
182 4: 183 5: 184 5: 185 6: 186 5: 187 5: 188 5: 189 5: 190 5: 191 5: 192 5: 193 5: 194 5: 196 5: 197 5: 198 5: 199 5: 199 5: 199 5: 199 5: 199 5: 190 5: 19	9 301 0 51 0 194 0 301 0 301 1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 1 1 1 1 1 1 1	.830E-01 .146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	238 239 240 241 242	64 64 64	301 65 208	1	.800E-01	294	77	301	1	.172E+0 .970E-0
183 5184 55186 56187 55186 56187 55190 55191 55196 55196 55199 551	0 51 0 194 0 301 0 301 1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 1 1 1 1 1 1	.146E+01 .701E+00 .870E-01 .830E-01 .146E+01 .701E+00	239 240 241 242	64 64	65 208	1	.108E+01			301	1	.970E-0
184 56 185 51 186 56 187 57 188 51 189 51 190 52 191 52 193 52 194 53 195 53 196 55 197 53 199 54 199 55 199 55 199 55 199 55	0 194 0 301 0 301 1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 1 1 1 1 1	.701E+00 .870E-01 .830E-01 .146E+01 .701E+00	240 241 242	64 64	208							
185 56 186 51 187 51 188 52 189 52 190 52 191 52 192 52 193 52 194 52 195 52 196 52 197 52 198 52 199 52	0 301 0 301 1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 1 4 1 1 1	.870E-01 .830E-01 .146E+01 .701E+00	240 241 242	64 64	208					79		
186 56 187 51 188 55 189 55 190 55 191 55 192 55 193 55 194 55 195 55 196 55 197 55 198 55 199 55 200 56 200 56	0 301 1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 4 1 1 1	.870E-01 .830E-01 .146E+01 .701E+00	241 242	64			.701E+00	296	78	222	4	
187 5, 188 5, 189 5, 190 5, 191 5, 192 5, 193 5, 194 5, 195 5, 196 5, 197 5, 198 5, 199 5, 200 5, 20	1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 1 1	.830E-01 .146E+01 .701E+00	242		301	ī	.860E-01	297	78	301		.542E+0
188 5 189 5 190 5 191 5 192 5 193 5 194 5 195 5 197 5 198 5 199 5 200 5 200 5	1 52 1 195 1 301 1 301 2 53 2 196 2 301	1 1 1	.146E+01 .701E+00			301	î	.790E-01				1	.124E+0
188 5 189 5 190 5 191 5 192 5 193 5 194 5 195 5 197 5 198 5 199 5 200 5 200 5	1 195 1 301 1 301 2 53 2 196 2 301	1 1 1	.701E+00		65	66	1		298	78	301	1	.910E-0
189 5: 190 5: 191 5: 192 5: 193 5: 194 5: 195 5: 196 5: 197 5: 198 5: 199 5: 200 5: 200 5:	1 301 1 301 2 53 2 196 2 301	1						.992E+00	299	79	80	1	.992E+0
190 5 191 5 192 5 193 5 194 5 195 5 196 5 197 5 199 5 200 5 201 5	1 301 2 53 2 196 2 301	1		244	65	209	4	.990E+00	300	79	223	4	.815E+0
191 5: 192 5: 193 5: 194 5: 195 5: 196 5: 197 5: 199 5: 200 5: 201 5:	2 53 2 196 2 301	1		245	65	301	1	.940E-01	301	79	301	1	.108E+
192 5; 193 5; 194 5; 195 5; 196 5; 197 5; 198 5; 199 5; 200 5; 201 5;	2 196 2 301		.830E-01	246	65	301	1	.870E-01	302	79	301	1	.870E-0
193 5; 194 5; 195 5; 196 5; 197 5; 198 5; 199 5; 200 5; 201 5;	2 301		.146E+01	247	66	67	1	.172E+01	303	80	.81	1	.108E+0
194 5: 195 5: 196 5: 197 5: 198 5: 199 5: 200 5: 201 5:		4	.701E+00	248	66	210	4	.815E+00	304	80	224	4	.990E+0
195 5: 196 5: 197 5: 198 5: 199 5: 200 5: 201 5:		1	.870E-01	249	66	301	1	.930E-01	305	80	301	ī	.930E-0
196 5: 197 5: 198 5: 199 5: 200 5: 201 5:	2 301	1	.830E-01	250	66	301	1	.103E+00	306	80	301	î	.910E-0
197 5: 198 5: 199 5: 200 5: 201 5:	3 54	1	-146E+01	251	67	68	1	-210E+01	307	81	82	î	
198 5: 199 5: 200 5: 201 5:	3 197	4	.701E+00	252	67	211	â	.542E+00	308	81	225	4	.146E+0
199 54 200 54 201 54 202 54	3 301	1	.870E-01	253	67	301	ĩ						.701E+0
199 54 200 54 201 54 202 54		ī	.830E-01	254	67	301	1	.930E-01	309	81	301	1	.840E-0
200 54 201 54 202 54		î	.146E+01					.125E+00	310	81	301	1	.830E-0
201 5		4		255	68	69	1	.125E+01	311	82	83	1	.146E+0
202 5			.701E+00	256	68	212	4	.655E+00	312	82	226	4	.701E+0
		1	.870E-01	257	68	301	1	.990E-01	313	82	301	1	.850E-0
		1	.830E-01	258	68	301	1	.172E+00	314	82	301	1	.820E-0
203 5		1	.146E+01	259	69	70	1	.120E+01	315	83	84	1	.146E+0
204 5		4	.701E+00	260	69	213	4	.655E+00	316	83	227	4	.701E+0
205 59	5 301	1	.870E-01	261	69	301	1	.990E-01	317	83	301	ī	.850E-0
206 5	5 301	1	.830E-01	262	69	301	î	.171E+00	318	83	301	î	
207 5	6 57	1	.146E+01	263	70	71	î	.115E+01	319				.820E-0
208 5	6 200	4	.701E+00	264						84	85	1	.146E+0
209 5		ĩ	.870E-01		70	214	4	.889E+00	320	84	228	4	.701E+0
210 5		1	.820E-01	265	70	301	1	.900E-01	321		301	1	.860E-0
211 5				266	70	301	1	.157E+00	322	84	301	1	.820E-0
		1	.146E+01	267	71	72	1	.115E+01	323	85	86	1	.146E+0
212 5		4	.701E+00	268	71	215	4	.889E+00	324	85	229	4	.701E+0
213 5		1	.860E-01	269	71	301	1	.710E-01	325	85	301	1	.860E-0
214 5		1	.820E-01	270	71	301	1	.138E+00	326	85	301	î	.820E-0
215 5	8 59	1	.146E+01	271	72	73	1	.115E+01	327	86	87	ī	.146E+0
216 5	8 202	4	.701E+00	272	72	216	4	.889E+00	328	86	230	â	
217 5		1	.860E-01	273	72	301	î	.330E-01					.701E+0
218 5		î	.820E-01	274					329	86	301	1	.860E-0
219 5		1			72	301	1	.670E-01	330	86	301	1	.820E-0
			.146E+01	275	73	74	1	.115E+01	331	87	88	1	.146E+0
		4	.701E+00	276	73	217	4	-889E+00	332	87	231	4	.701E+0
221 59		1	.860E-01	277	73	301	1	.670E-01	333	87	301	1	.860E-0
222 5		1	.820E-01	278	73	301	1	-310E-01	334	87	301	î	.820E-0
223 6		1	-146E+01	279	74	75	ī	.115E+01	335	88	89	1	.146E+0
224 6		4	.701E+00	280	74	218	4	.889E+00	336		232	4	.701E+0

Brn	ron To	Ta	q Conduct	Brn	h Fr	om To	Tac	g Conduct	Brn	h Pr	om To	me	g Conduct
337	88 301	1	.850E-01	393	102	301		.900E-01		116	301	14	g Conduct
338	88 301	1	.820E-01		103			.146E+01		117			.830E-01
339	89 90	1	.146E+01	395	103	247		.701E+00		117		1	.146E+01
340	89 233	4	.701E+00		103			.760E-01		117		4	.701E+00
341	89 301	1	.850E-01		103		î	.840E-01				1	.830E-01
342	89 301	ī	.810E-01		104		î	.146E+01		117		1	.830E-01
343	90 91	î	.146E+01		104		4			118		1	.129E+01
344	90 234	4	.701E+00					.701E+00		118		4	.701E+00
345	90 301	ĩ	.850E-01		104		1	.780E-01	456	118	301	1	.820E-01
346	90 301	î	.810E-01				1	.840E-01	457	118	301	1	.840E-01
347	91 92	i	.146E+01		105		1	.146E+01		119		1	.115E+01
348	91 235	4			105		4	.701E+00	459	119	263	4	.889E+00
349	91 301	1	.701E+00 .850E-01		105		1	.790E-01		119		1	.860E-01
350	91 301	î			105			.830E-01		119		1	.960E-01
351	92 93		.810E-01		106		1	.146E+01	462	120	121	1	.115E+01
352	92 236	1	.146E+01		106			.701E+00		120		4	.889E+00
353		4	.701E+00		106		1	.810E-01		120		1	.650E-01
354	92 301	1	.850E-01		106			.830E-01		120		1	.113E+00
355	92 301	1	.810E-01		107			.146E+01	466	121	122	1	.115E+01
	93 94	- 1	.146E+01		107			.701E+00		121		4	.889E+00
356	93 237	4	.701E+00		107			.820E-01	468	121	301	1	.220E-01
357	93 301	1	.850E-01		107			.830E-01	469	121	301	1	.133E+00
358	93 301	1	.810E-01		108			.146E+01	470	122	123	1	.115E+01
359	94 95	1	.146E+01	415	108	252	4	.701E+00	471	122	266	4	.889E+00
360	94 238	4			108		1	.840E-01	472	122	301	1	.420E-01
361	94 301		.850E-01		108		1	.830E-01	473	123	124	1	.115E+01
362	94 301	1	.810E-01		109			.146E+01	474	123	267	4	.889E+00
363	95 96	1	.146E+01		109		4	.701E+00	475	123	301	1	.760E-01
364	95 239	4	.701E+00		109			.850E-01	476	124	125	1	.129E+01
365	95 301	1	.850E-01		109		1	.830E-01	477	124	268	4	.889E+00
366	95 301		.810E-01		110			.146E+01	478	124	301	1	.940E-01
367	96 97	1	.129E+01		110		4	.701E+00	479	125	126	1	.146E+01
368	96 240	4	.701E+00		110			.850E-01	480	125	269	4	.701E+00
369	96 301	1	.840E-01		110			.830E-01	481	125	301	1	.490E-01
370	96 301		.800E-01		111		1	.146E+01	482	125	301	1	.860E-01
371	97 98	1	.115E+01	427	111	255	4	.701E+00	483	126	127	1	.146E+01
372	97 241	4	.889E+00	428	111	301	1	.850E-01	484	126	270	4	.701E+00
3.73	97 301	1	.900E-01		111		1	.830E-01	485	126	301	1	.680E-01
374	97 301	1	.930E-01	430	112	113	1	.146E+01	486	126	301	1	.860E-01
375	98 99	1	.115E+01	431	112	256	4	.701E+00	487	127	128	1	.146E+01
376	98 242	4	.889E+00	432	112	301	1	.850E-01	488	127	271	4	.701E+00
377	98 301	1	.690E-01	433	112	301	1	.830E-01	489	127	301	1	.820E-01
378	98 301	1	.123E+00	434	113	114	1	.146E+01		127		ī	.850E-01
379	99 100	1	.115E+01	435	113	257	4	.701E+00	491	128	129		.146E+01
380	99 243	4	.889E+00	436	113	301	1	.850E-01		128		ã	.701E+00
381	99 301	1	.260E-01		113		1	.830E-01		128		i	-910E-01
382	99 301	1	.149E+00	438	114	115	1	.146E+01	494	128	301	î	.840E-01
	100 101	1	.115E+01	439	114	258	4	.701E+00		129		ī	.146E+01
	100 244	4	.889E+00	440	114	301	1	.850E-01		129		4	.701E+00
385	100 301	1	.380E-01	441	114	301	1	.830E-01		129		ī	.970E-01
386	101 102	1	.115E+01	442	115	116	1	.146E+01		129		î	.830E-01
	101 245	4	.889E+00	443	115	259	4	.701E+00		130		î	.146E+01
	101 301	1	.920E-01	444	115	301	1	.840E-01		130		4	.701E+00
	101 301	1	.720E-01	445	115	301	1	.830E-01	501	130	301	ī	.100E+00
	102 103	1	.129E+01	446	116	117	1	.146E+01	502	130	301	î	.830E-01
	102 246	4	.889E+00	447	116	260	4	.701E+00	503	131	132	1	.146E+01
392	102 301	1	.124E+00	448	116	301	1	.840E-01		131			701E+00

Brnh From To	Tag Conduct	Brnh From To	Tag Cond		_
505 131 301	1 .101E+00	561 158 157	5 .174E+03	Brnh From To	Tag Conduct
506 131 301	1 .830E-01	562 159 158	5 .174E+03	617 214 213	5 .174E+03
507 132 133	1 .146E+01	563 160 159		618 215 214	5 .174E+03
508 132 276	4 .701E+00			619 216 215	5 .174E+03
509 132 301	1 .100E+00	564 161 160	5 .174E+03	620 217 216	5 .174E+03
510 132 301	1 .830E-01	565 162 161	5 .174E+03	621 218 217	5 .174E+03
511 133 134	1 .146E+01	566 163 162	5 .174E+03	622 219 218	5 .174E+03
512 133 277		567 164 163	5 .174E+03	623 220 219	5 .174E+03
513 133 301	4 .701E+00	568 165 164	5 .174E+03	624 221 220	5 .174E+03
514 133 301	1 .970E-01	569 166 165	5 .174E+03	625 222 221	5 .174E+03
515 134 135	1 .830E-01	570 167 166	5 .174E+03	626 223 222	5 .174E+03
	1 .146E+01	571 168 167	5 .174E+03	627 224 223	5 .174E+03
516 134 278	4 .701E+00	572 169 168	5 .174E+03	628 225 224	5 .174E+03
517 134 301	1 .910E-01	573 170 169	5 .174E+03	629 226 225	5 .174E+03
518 134 301	1 .840E-01	574 171 170	5 .174E+03	630 227 226	5 .174E+03
519 135 136	1 .146E+01	575 172 171	5 .174E+03	631 228 227	5 .174E+03
520 135 279	4 .701E+00	576 173 172	5 .174E+03	632 229 228	5 .174E+03
521 135 301	1 .820E-01	577 174 173	5 .174E+03	633 230 229	5 .174E+03
522 135 301	1 .840E-01	578 175 174	5 .174E+03	634 231 230	5 .174E+03
523 136 137	1 .146E+01	579 176 175	5 .174E+03	635 232 231	5 .174E+03
524 136 280	4 .701E+00	580 177 176	5 .174E+03	636 233 232	5 .174E+03
525 136 301	1 .680E-01	581 178 177	5 .174E+03	637 234 233	5 .174E+03
526 136 301	1 .860E-01	582 179 178	5 -174E+03	638 235 234	5 .174E+03
527 137 138	1 .146E+01	583 180 179	5 .174E+03	639 236 235	5 .174E+03
528 137 281	4 .701E+00	584 181 180	5 .174E+03	640 237 236	5 .174E+03
529 137 301	1 .490E-01	585 182 181	5 .174E+03	641 238 237	
530 137 301	1 .870E-01	586 183 182	5 .174E+03	642 239 238	5 .174E+03 5 .174E+03
531 138 139	1 .146E+01	587 184 183	5 .174E+03	643 240 239	5 .174E+03
532 138 282	4 .701E+00	588 185 184	5 .174E+03	644 241 240	5 .174E+03
533 138 301	1 .240E-01	589 186 185	5 .174E+03	645 242 241	
534 138 301	1 .880E-01	590 187 186	5 .174E+03	646 243 242	
535 139 140	1 .146E+01	591 188 187	5 .174E+03	647 244 243	
536 139 283	4 .701E+00	592 189 188	5 .174E+03	648 245 244	
537 139 301	.1 .900E-01	593 190 189	5 .174E+03		5 .174E+03
538 140 141	1 .160E+01	594 191 190	5 .174E+03	649 246 245	5 .174E+03
539 140 284	4 .701E+00	595 192 191	5 .174E+03	650 247 246	5 .174E+03
540 140 301	1 .910E-01	596 193 192	5 .174E+03	651 248 247	5 .174E+03
541 141 142	1 .178E+01	597 194 193		652 249 248	5 .174E+03
542 141 285	4 .576E+00	598 195 194		653 250 249	5 .174E+03
543 142 143	1 .178E+01	599 196 195		654 251 250	5 .174E+03
544 142 286	4 .576E+00	600 197 196	5 .174E+03	655 252 251	5 .174E+03
545 143 144	1 .178E+01	601 198 197		656 253 252	5 .174E+03
546 143 287			5 .174E+03	657 254 253	5 .174E+03
547 144 288	4 .576E+00 4 .576E+00	602 199 198	5 .174E+03	658 255 254	5 .174E+03
548 145 302		603 200 199	5 .174E+03	659 256 255	5 .174E+03
549 146 145		604 201 200	5 .174E+03	660 257 256	5 .174E+03
550 147 146		605 202 201	5 .174E+03	661 258 257	5 .174E+03
551 148 147		606 203 202	5 .174E+03	662 259 258	5 .174E+03
552 149 148	5 .174E+03	607 204 203	5 .174E+03	663 260 259	5 .174E+03
	5 .174E+03	608 205 204	5 .174E+03	664 261 260	5 .174E+03
553 150 149	5 .174E+03	609 206 205	5 .174E+03	665 262 261	5 .174E+03
554 151 150	5 .174E+03	610 207 206	5 .174E+03	666 263 262	5 .174E+03
555 152 151	5 .174E+03	611 208 207	5 .174E+03	667 264 263	5 .174E+03
556 153 152	5 .174E+03	612 209 208	5 .174E+03	668 265 264	5 .174E+03
557 154 153	5 .174E+03	613 210 209	5 .174E+03	669 266 265	5 .174E+03
558 155 154	5 .174E+03	614 211 210	5 .174E+03	670 267 266	5 .174E+03
559 156 155	5 .174E+03	615 212 211	5 .174E+03	671 268 267	5 .174E+03
560 157 156	5 .174E+03	616 213 212	5 .174E+03	672 269 268	5 .174E+03
					,42.03

	Tag Conduct
673 270 269	5 .174E+03
674 271 270	5 .174E+03
675 272 271	5 .174E+03
676 273 272	
677 274 273	5 .174E+03
678 275 274	
679 276 275	5 .174E+03
680 277 276	
681 278 277	5 .174E+03
682 279 278	5 .174E+03
683 280 279	5 .174E+03
684 281 280	5 .174E+03
685 282 281	
686 283 282	5 .174E+03
687 284 283	5 .174E+03
688 285 284	5 .174E+03
689 286 285	
690 287 286	5 .174E+03
691 288 287	5 .174E+03

APPENDIX E. TASS NODAL TEMPERATURE OUTPUT

The following output summarizes the Steady State Thermal Analyzer output for the mass flow rates considered in this analysis.

TALSR(METRIC) -- RUN 1. SIMPLE MODEL. MASS FLOW 149.7 kg/hr (330 lbm/hr) Temperatures, degC 1 25.19 2 25.26 3 25.40 4 25.67 5 26.22 6 26.60 7 26.97 8 27.31 q 27.60 10 27.81 11 27.97 12 28.07 13 28.13 28.16 15 28.10 17 28.01 14 28.15 16 18 27.87 19 20 27.65 27.33 21 26.85 22 26.58 23 26.55 24 27.19 25 27.56 26 27.76 27 27.95 28 28.03 29 28.08 30 28.10 31 28.12 32 28.13 33 28.14 34 28.15 35 28.16 36 28.17 37 28.18 38 28.19 39 28.19 40 28.19 41 28.17 42 28.12 43 27.99 44 27.61 45 27.15 46 27.66 47 27.93 48 28.05 49 28.19 50 28.25 51 28.29 52 28.31 53 28.32 54 28.34 55 28.35 56 28.36 57 28.37 58 28.37 59 28.38 60 28.39 61 28.40 62 28.40 63 28.41 64 28.40 65 28.37 66 28.84 70 67 29.28 68 29.43 69 29.36 28.87 71 28.39 72 27.84 73 27.85 74 28.42 75 28.92 76 29.43 77 29.53 78 29.39 79 28.97 80 28.53 81 28.58 82 28.61 83 28.62 84 28.64 85 28.65 86 28.66 87 28.67 88 28.67 89 28.68 90 28.69 91 28.70 92 28.71 93 28.71 94 28.71 95 28.69 96 28.64 97 28.53 98 99 28.19 100 27.73 101 28.18 102 28.43 28.57 28.71 104 28.77 105 28.80 106 28.82 107 28.84 108 28.85 28.86 110 28.87 111 28.88 112 28.88 113 28.89 114 28.90 28.90 116 28.89 117 28.87 118 28.81 119 28.65 120 28.48 28.15 122 27.57 123 27.61 124 27.88 125 28.34 126 28.64 28.86 128 29.01 129 29.11 130 29.17 131 29.20 132 29.19 29.15 134 29.07 135 28.95 136 28.77 137 28.53 138 28.23 27.91 140 27.57 141 27.09 142 26.84 143 26.72 144 26.66 25.00 146 25.00 147 25.00 148 25.00 149 25.01 150 25.02 25.02 152 25.03 153 25.04 154 25.05 155 25.07 156 25.08 25.09 158 25.10 159 25.12 160 25.13 161 25.14 162 25.15 25.16 164 25.17 165 25.18 166 25.18 167 25.19 168 25.20 25.21 170 25.23 171 25.24 172 25.25 173 25.26 174 25.27 25.28 176 25.29 177 25.31 178 25.32 179 25.33 180 25.34 25.35 182 25.36 183 25.37 184 25.39 185 25.40 186 25.41 25.42 188 25.43 189 25.44 190 25.45 191 25.46 192 25.48

103 109 115 121 127 133 139 145 151 157 163 169 175 181 187 193 25.52 197 25.54 25.49 194 25.50 195 25.51 196 25.53 198 199 25,56 200 25.57 201 25.58 202 25.59 203 25,60 204 25.61 205 25.62 206 25.63 207 25.65 208 25.66 209 25.67 210 25.69 211 25.70 212 25.71 213 25.73 214 25.74 215 25.75 216 25.77 217 25.78 218 25.79 219 25.81 220 25.82 221 25.83 222 25.84 223 25.86 224 25.87 225 25.88 226 25.90 227 25.91 228 25.92 229 25.93 230 25.94 231 25.95 232 25.96 233 25.97 234 25.98 235 25.99 236 26.00 237 26.02 238 26.03 239 26.04 240 26.05 241 26.06 242 26.07 243 26.09 245 26.10 246 26.08 244 26.11 247 26.12 248 26.14 249 26.15 250 26.16 251 26.17 252 26.18 253 26.19 254 26.20 255 26.21 256 . 26.22 257 26.23 258 26.24 259 26,25 260 26.26 261 26.27 262 26.28 263 26.30 264 26.31 26.34 269 265 26.32 266 26.32 267 26.33 268 26.35 270 26.36 271 26.40 275 26.41 276 26.42 26.37 272 26.38 273 26.39 274 277 26.48 26.43 278 26.44 279 26.45 280 26.46 281 26.47 282 283 26.48 284 26.49 285 26.49 286 26.49 287 26.49 288 26.49 301 40.00 302 25.00

TALSR	METRIC)	RUN	2. COMP	LEX M	ODEL, MA	SS PTOW	149 7	ka (hu	(220 11	- a	
Temper	atures.	deac					243.7	A4/111	(220 1	om/nr)	
1	25.21	2	25.28	3	25.44	4	25.74	5	26.33	6	26.73
7	27.09		27.41	9	27.68	10	27.87		28.01	12	28.10
13	28.16		28.18	15	28.17		28.13		28.04		27.90
19	27.69	20	27.39	21	26.91		26.65		26.62		27.20
25	27.56		27.78	27	27.98		28.06		28.10		28.13
31	28.15	32	28.15	33	28.16	34	28.16		28.16		28.16
37	28.14		28.13	39	28.11		28.09		28.07		28.03
43	27.97		27.62	45	27.18	46	27.65		27.93		28.07
49	28.22		28.28	51	28.32	52	28.34	53	28.35		28.36
55	28.37		28.37		28.37	58	28.38	59	28.38		28.39
61	28.39	62	28.39	63	28.38	64	28.37	65	28.32		28.79
67	29.24		29.42	69	29.35	70	28.87		28.39		27.85
73	27.85	74	28.42	75	28.91	76	29.41	77	29.49		29.34
79	28.91		28.50	81	28.57	82	28.60		28.62		28.63
85	28.65		28.65		28.66	88	28.66	89	28.66		28.67
91	28.68		28.68		28.68		28.68	95	28,66		28.60
97	28.49		28.40		28.16	100	27.74	101	28.18		28.55
103	28.65		28.70	105	28.74	106	28.77	107	28 80	108	28.83
109	28.85		28.86	111	28.87	112	28.88	113	28.89	114	28.89
115	28.89	116	28.87	117	28.84	118	28.78	119	28.62	120	28.44
121	28.13	122	27.62	123	27.67	124	27.93	125	28.37	126	28.67
127	28.87	128	29.02	129	29.11	130	29.16	131	29.19		29.18
133	29.15	134	29.08	135	28.96	136	28.80	137	28.57	138	28.29
139	27.97	140	27.63	141	27.12	142	26.86	143	26.73	144	26.67
145	25.00	146	25.00	147		148	25.01	149	25.01	150	25.02
151	25.03	152	25.04	153	25.05	154	25.06	155	25.07	156	25.08
157	25.09	158	25.11	159	25.12 25.18	160	25.13	161	25.14	162	25.15
163	25.16	164	25.17	165	25.18	166	25.19	167	25.20	168	25.21
169	25.22	170	25.23	171	25.24 25.31	172	25.25	173	25.27		25.28
175	25.29	176	25.30	177	25.31	178	25.32	179	25.33		25.35
181	25.36		25.37	183	25.38	184	25.39	185	25.40		25.41
187	25.42		25.44	189	25.44	190	25.46	191	25.47	192	25.48
193	25.49		25.50	195	25.51	196					25.55
199	25.56	200	25.57	201	25.58	202	25.59	203	25.60		25.62
205	25.63	206	25.64	207	25.65		25.66		25.68	210	25.69
211	25.70	212	25.71	213	25.73 25.81	214	25.74	215	25.76	216	25.77
217	25.78	218	25.79	219	25.81	220	25.74 25.82 25.90	221	25.84		25.85
223	25.86		25.88	225	25.89 25.95	226			25.91		25.92
229	25.93		25.94				25.96		25.97		25.98
235	26.00				26.02		26.03				26.05
241	26.06		26.07	243	26.08 26.15	244	26.09	245	26.10	246	26.11
247	26.12		26.14						26.17	252	26.18
	26.19		26.20		26.21		26.22		26.23		26.24

26.27 262 26.33 268

26.39 274

26.45 280

26,49 286

26.28 263 26.34 269

26.40 275

26.46 281 26.49 287

26.30 264

26.35 270

26.41 276 26.47 282 26.49 288

26.31

26.35

26.42

26.48

26.49

26.26 261 26.32 267

26.38 273

26.44 279

26.49 285

25.00

259

265

271

277

283

301

26.25 260

26.32 266

26.36 272

26.43 278

26.48 284

40.00 302

TALSR(METRIC)-	RUN	3. COMP	EX !	HODEL, M	ASS	PLOW	OF	68	kg/hr	(150	11	m/hr)	
	atures,													
1	25.69	2	25.81	3	26.0		4	26.	.51	5	27.	28	6	27.87
7	28.41	8	28.88	9		6 1	.0	29.	.55	11	29.	76	12	29.89
13	29.97	14	30.01	15	30.0	0 1	16	29.	.93	17	29.	81	18	29.62
19	29.33	20	28.95	21	28.3	9 7	22	28	.07	23	28.	06	24	28.71
25	29.18	26	29.50	27	29.7	5 2	28	29		29	29.		30	30.01
31	30.04	32	30.06	33	30.0	7	34	30	.08	35	30.	08	36	30.07
37	30.06	38	30.04	39	30.0	2 4	40	29	.99	41	29.	94	42	29.88
43	29.78	44	29.40	45	28.9	6 4	16	29.	44	47	29.	77	48	29.96
49	30.15	50	30.25	51	30.3	1 5	52		34	53	30.		54	30.39
55	30.40	56	30.41	57	30.4	2	58	30	42	59	30.	43	60	30.44
61	30.45	62	30.45	63	30.4	6 6	54	30	46	65	30.	47	66	30.97
67	31.41	68	31.59	69			70		.03	71	30.		72	29.94
73	29.95	74	30.54	75			76		.60	77	31.		78	31.56
79	31.16	80	30.73	81	30.7		32		.78	83	30.	an	84	30.81
85	30.83	36	30.84	87			38		.86	89	30.	86	90	30.87
91	30.88	92	30.88	93			94		.87	95	30.		96	30.77
97	30.63	98	30.50	99						101			102	30.68
103	30.83		30.92							107			108	31.10
109	31.13		31.15							113	31	19	114	31.19
115	31.18		31.16							119			120	30.59
121	30.22		29.69							125			126	30.88
127	31.14		31.33			5 1	30			131			132	31.56
133	31.51		31.41		31.2	6 1	16			137			138	30.37
139	29.94		29.48							143			144	28.24
145	25.00		25.01	147	25.0	1 1	40	25	02	149	25	03	150	25.04
151	25.06		25.07							155			156	25.16
157	25.18		25.20							161			162	25.29
163	25.31		25.33							167			168	25.40
169	25.42		25.44							173			174	25.53
175	25.55		25.57							179			180	25.65
181	25.67		25.69							185			186	25.77
187	25.80		25.82							191			192	25.91
193	25.93		25.95							197			198	26.03
199	26.05		26.07			9 2	12	26	11	203	26	13	204	26.15
205	26.17		26.19	207	26.2			26	23	209			210	26.28
211	26.30		26.33							215			216	26.42
217	26.44		26.47							221			222	26.56
223	26.58		26.61			3 2	26	26	65	227			228	26.69
229	26.71		26.73							233			234	26.80
235	26.82		26.84							239			240	26.92
241	26.94		26.96							245			246	27.04
247	27.06		27.07							251			252	27.15
253	27.17		27.19							257			258	27.26
259	27.28		27.30							263			264	27.37
265	27.39		27.40							269			270	27.46
271	27.48		27.50							275	27.	55	276	27.57
277	27.59		27.61							281			282	27.67
283	27.68		27.69							287			288	27.70
301	40.00		25.00	-03	27.0	., .		27	. , 0	207	27.	. 0	203	
201	40.00	302	45.00											

TALSR(METRIC) -	RUN	4. COMP	LEX !	MODEL. N	ASS FLOW	OF	272.2	cg/hr (60)	1 hm	(hw)
Temper	atures,	deqC							-97 (0 0 .	,	y - 112)
1	25.07	2	25.11	3	25.2	1 4	25.	41 5	25.87	6	26.14
7	26.38	8	26.61	9	26.8		26.		27.03	12	27.09
13	27.13	14	27.14	15	27.1		27.		27.05	18	26.95
19	26.80	20	26.57	21	26.1		25.		25.95	24	26.43
25	26.70	26	26.85	27	26.9		27.		27.07	30	27.09
31	27.10	32	27.10	33	27.1		27.	10 35	27.10	36	27.10
37	27.09	38	27.08	39	27.0		27.	05 41	27.04	42	27.10
43	26.99	44	26.70	45	26.3		26.		26.94	48	27.03
49	27.15	50	27.19	51	27.2		27.		27.23	54	27.23
55	27.24	56	27.24	57	27.2	4 58	27.		27.24	60	27.24
61	27.25	62	27.25	63	27.2		27.		27.14	66	27.53
67	27.95	68	28.10	69			27.	62 71	27.23	72	26.76
73	26.76	74	27.25	75			28.		28.15	78	28.01
79	27.61	80	27.26	81	27.3		27.	38 83	27.40		27.41
85	27.42	86	27.42	87	27.4	3 88	27.	43 89	27.43	90	27.43
91	27.44	92	27.44	93	27.4	4 94	27.		27.43		27.39
97	27.30	98	27.24	99		5 100		55 101	27.06	100	27.36
103	27.42		27.46	105	27.4	8 106	27	50 107	27.52	102	27.54
109	27.55		27.56			7 112	27	57 113	27.58	114	27.58
115	27.58		27.57	117	27 5	6 118	27	51 119	27.39	120	27.27
121	27.03		26.58			3 124		33 125	27.20		27.43
127	27.58		27.68			5 130	27	78 131	27.80		27.80
133	27.77	124	27.72	125				52 137	27.35	130	27.14
139	26.92		26.68			7 142		09 143	26.00		25.97
145	25.00		25.00			0 148	25	00 149	25.01		25.01
151	25.01		25.02			3 154		03 155	25.04		25.05
157	25.06		25.06	150	25.0	7 160	25	08 161	25.08		25.09
163	25.10		25.10	165	25.1	1 166	25	11 167	25.12		25.12
169	25.13		25.14	171	25 1	4 172	25	15 173	25.16		25.16
175	25.17	176	25.18	177	25.1	8 178	25	19 179	25.20	100	25.20
181	25.21		25.22			2 184		23 185	25.24	106	25.24
187	25.25		25.26			6 190	25	27 191	25.28		25.29
193	25.29		25.30			1 196	25	31 197	25.32		25.33
199	25.33		25.34			5 202		35 203	25.36	204	25.37
205	25.37		25.38		25.3	9 208		39 209	25.40		25.41
211	25.42	21.2	25.43			4 214	25.	45 215	25.45	216	25.46
217	25.47		25.47			8 220		49 221	25.50	222	25.51
223	25.52		25.53			3 226		54 227	25.55	228	25.55
229	25.56		25.57		25.5	7 232	25.	58 233	25.59		25.59
235	25.60		25.61			1 238		62 239	25.62		25.63
241	25.64		25.65			5 244		66 245	25.66		25.67
247	25.68		25.68			9 250		70 251	25.70		25.71
253	25.72		25.72			3 256		74 257	25.74		25.75
259	25.76		25.76			7 262		77 263	25.78		25.79
265	25.79		25.80			0 268		81 269	25.81		25.82
271	25.82		25.83	273		4 274		84 275	25.85		25.86
277	25.86		25.87			8 280		88 281	25.89		25.89
283	25.90		25.90		25.9	0 286		90 287	25.90		25.90
301	40.00		25.00	-33	45.1		-5.	207	-5.70	-20	
201	-0.00		23.00		-						

										Page	No. 1
TALSRO	METRIC)	RUN	5. COMP	T.EX MOD	DET. MO	ASS FLOW	OF 16	2 9 201	hw (900	1 he	(hm)
Temper	atures.	deac			,		0. 30	e., Ag,	117 (900	LUM	HE)
1	25.04	2	25.07	3	25.14	4 4	25.31	5	25.72	6	25.93
7	26.13	8	26.32	9	26.4		26.59	11	26.67	12	26.72
13	26.75	14	26.76	15	26.75		26.73	17	26.68	18	26.60
19	26.43	20	26.28	21	25.95		25.77	23	25.73	24	26.17
25	26.39	26	26.51	27	26.6		26.67	29	26.69	30	26.71
31	26.71	32	26.71	33	26.7		26.72	35	26.72	36	26.71
37	26.70	38	26.69	39	26.6		26.67	41	26.66	42	26.65
43	26.63	44	26.37	45	26.00		26.39	47	26.59	48	26.65
49	26.75	50	26.79	51	26.80		26.81	53	26.82	54	26.82
55	26.82	56	26.32	57	26.3		26.83	59	26.83	60	26.83
61	26.83	62	26.83	63	26.8		26.80	65	26.72	66	27.06
67	27.45	68	27.59	69	27.55		27.15	71	26.81	72	26.38
73	26.38	74	26.82	75	27.1		27.58	77	27.63	78	27.50
79	27.12	80	26.81	81	26.9		26.93	83	26.35	84	26.96
8.5	26.97	86	26.97	87	26.9		26.97	89	26.97	90	26.98
91	26.98	92	26.98	93	26.99		26.99	95	26.38	96	26.95
97	26.86	98	26.82	99	26.6		26.28		26.66		26.93
103	26.97	104	27.00		27.0		27.03		27.05		27.06
109	27.07	110	27.08		27.09		27.09		27.09		27.10
115	27.10		27.09		27.08		27.05		26.94		26.34
121	26.63		26.23		26.2		26.45		26.78		26.97
127	27.10		27.19			130	27.27		27.28		27.28
133	27.26		27.22		27.15		27.04		26.90		26.73
139	26.54		26.35		25.98		25.83		25.76	144	25.74
145	25.00		25.00			148	25.00		25.00	150	25.01
151	25.01		25.02		25.0		25.03		25.03		25.04
157	25.04		25.05		25.05		25.06		25.07		25.07
163	25.07	164	25.08		25.08		25.09		25.09		25.09
169	25.10	170	25.10	171	25.17		25.12		25.12		25.13
175	25.13	176	25.14	177	25.14		25.15		25.15		25.16
131	25.16		25.17		25.1		25.18		25.18		25.19
187	25.19		25.20		25.20		25.21		25.21		25.22
193	25.22	194	25.23		25.24		25.24		25.25		25.25
199	25.26	200	25.26	201	25.2	7 202	25.27		25.28		25.28
205	25.29	206	25.29	207	25.30		25.30		25.31		25.32
211	25.32		25.33		25.34		25.34		25.35		25.36
217	25.36	218	25.37	219	25.3		25.38		25.39		25.39
223	25.40	224	25.41		25.41		25.42		25.42		25.43
229	25.43	230	25.44	231	25.44	232	25.45		25.45		25.46
235	25.46		25.47		25.47		25.48		25.48		25.49
241	25.49		25.50		25.50		25.51		25.51		25.52
247	25.52	248	25.53	249		3 250	25.54		25.54		25.55
253	25.55		25.56			5 256	25.57		25.57		25.58
259	25.59	260	25.59			262	25.60		25.61		25.61
265	25.62	266	25.62		25.6		25.62			270	25.63
271	25.64		25.64		25.65		25.65		25.66		25.66
277	25.67		25.68		25.68		25.68		25.69		25.69
283	25.70		25.70		25,70		25.70		25.70		25.70
301	40.00	302	25.00	-							
			_2100								

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